THE
RAILWAY GAZETTE
A Journal of Management, Engineering and Operation
INCORPORATING
Railway Engineer · TRANSPORT · The Railway News
The Railway Times · Herapath's Railway Journal · RAILWAY RECORD.
RAILWAYS ILLUSTRATED · ESTABLISHED 1835 · RAILWAY OFFICIAL GAZETTE

PUBLISHED EVERY FRIDAY
AT
33, TOTHILL STREET, WESTMINSTER, LONDON, S.W.1

Telegraphic Address: "TRAZETTE PARL., LONDON"
Telephone No.: WHITEHALL 9233 (6 lines)

Annual subscription payable in advance and postage free:
British Isles and Abroad .....£2 5s. 0d.
Single Copies .....One Shilling
Registered at the General Post Office, London, as a Newspaper

VOL 70. NO. 14 FRIDAY, APRIL 7, 1939

CONTENTS

	PAGE
Editorials	569
Publications Received	575
The Scrap Heap	576
Overseas Railway Affairs	577
Problems Connected with Locomotive Design—IV	579
A.T.C. on the German State Railway	581
Road Transport Section	583

Railway Arrangements for Easter

AS in previous years, the four main-line railway companies have made comprehensive arrangements for Easter Week traffic; they include the duplication of express services, the provision of relief and special trains, and the running of day and half-day excursions. On the Great Western Railway, for instance (whose Cornish Riviera Limited will run in four parts), Thursday, April 6, will be the peak day, when some 90,000 passengers are expected to pass through Paddington, and the normal services will be nearly doubled. The fares for the day and half-day trips on Good Friday, Saturday, Sunday, and Monday are between 3s. 8d. and 19s. 9d. Equally complete are the Easter arrangements for the L.N.E.R., which plans to run approximately a thousand extra trains over Easter week-end. The many day and half-day excursions include a trip from King's Cross to Spalding with a coach tour of the British bulb fields; one from London to Edinburgh for 27s. 3d., and one on the evening of Easter Saturday from Sheffield to Manchester for the firework display. The Flying Scotsman will run in duplicate or triplicate during the holiday period. Marylebone and Liverpool Street, as well as King's Cross, will receive and despatch many extra trains. For those who wish to spend the first holiday in the year on the Continent there are cheap week-end tickets *via* Harwich to Dutch and Belgian stations; return fares from Liverpool Street are from £2 1s. 10d. upwards.

* * * *

Round Britain by Air

A travel agency offers for the summer of this year a thirteen-day air tour of Great Britain that will take participants from London to the Channel Islands and the Scillies, then northwards *via* Ireland and Scotland to the Orkneys and Shetlands, and at last home again, down the East Coast, to London. All the 2,200-mile itinerary is to be made by regular services, with railway-associated operators predominating. Jersey Airways, in which the G.W.R. and Southern Railways are interested, will provide transport from London (Heston) to Jersey and back to Exeter. There the passenger will transfer to the aircraft of Great Western & Southern Air Lines for the flight to Scilly and back, continuing with the same company from Exeter to Bristol. Onwards to Dublin and Belfast the link will be provided by Irish Sea Airways Limited, but thenceforward to Glasgow, Inverness, the Orkneys, and Shetlands, and back to Aberdeen, the service will be provided throughout by railway-connected companies—first by Railway Air Services itself and then by Scottish Airways, in which the L.M.S.R. has an interest. The return to London along the East Coast will be made in the machines of North Eastern Airways, this area being one of the few around our coasts to which railway air interests have not yet penetrated.

* * * *

Allocation of Railway Seats

One of the attractions offered by road transport in respect of long journeys is the fact that every passenger booking in advance is allocated a seat, and that no standing passengers are carried. This method is facilitated by the comparatively small catchment areas usually served, and of course it involves the refusal of passengers once every seat is booked. Such a system is not easily applicable to the different conditions of rail travel, but an interesting rail experiment on these lines was mentioned by Colonel A. S. Redman in his recent paper to the Institute of Transport. He said that in 1921, when he was Traffic Superintendent of the Somerset & Dorset Railway, he organised the first post-war railway excursions in Great Britain. These were run in competition with motor-coach trips between Bath and Bournemouth. The plan he adopted was to ration excursion train accommodation by controlling from headquarters the bookings at every station along the line and by allotting compartments according to the advance tickets sold at every booking office until the train was completely booked. Thus parties of friends travelled together, there was no overcrowding, and the popularity of the system was exemplified by fully-booked trains. It seems therefore that the extra work entailed was justified; but open stations, wide catchment areas, and last-minute bookings (as well as the possibility of increasing the length of trains), all make such precision less easy to apply to railway than to road transport.

* * * *

British and American Permanent Way

During his visit to the United States last year, Mr. W. K. Wallace, Chief Civil Engineer of the L.M.S.R., spoke to the Roadmasters and Maintenance of Way Association on British permanent way, comparing it with American. One of the points which had struck him particularly in the States was the good alignment of the track, even where the surface was not very good. This he attributed to the stiffness of the flat-bottom rail and to the fact that the absence of chairs made possible adequate fishplates. An advantage most American railways enjoyed was that in maintaining the track it was possible to give it a lift on new ballast, thus enabling it to stand for three to five years before the process was repeated. This was not possible to the same extent in Great Britain because of the large number of overbridges where there is the minimum clearance. Nevertheless, the adoption by the L.M.S.R. of measured shovel packing had enabled track to stand up in good condition twice as long as under the former method. Mr. Wallace drew attention to the fact that all rails now used in Great Britain are oven-cooled and that the Southern Railway, with its intense suburban

XUM

traffic of multiple-unit electric trains, is now using 10,000 tons of Sandberg sorbitic rails a year, which it considers good economy. The L.M.S.R. is at present trying 5,000 tons of such rails.

* * * *

Co-operation between Farmers and the Railway

More than twenty years ago, the Baltimore & Ohio Railroad began a " Good Neighbour " policy with the farmers in its territory, in the belief that it was both pleasant and good business to regard one's neighbour as a friend. As we have previously recorded (see our issue of July 15, 1938), the company now has agricultural agents who concern themselves with efficient output, improved quality, and marketing methods for agricultural produce. The Baltimore & Ohio programme benefits farmer and railway alike; it helps farmers to increase their earnings, and thus brings more freight traffic to the company. Special trains are run to farming centres; the farmers come in from the surrounding country to the train with soil samples for the company's travelling doctors to test, or, perhaps, to buy purebred bulls or rams which the railway, acting in co-operation with the agricultural colleges, distributes. In these and other ways, the Baltimore & Ohio pursues a progressive policy, and its methods, which are set out in a lucid illustrated brochure, are worthy of study by all railways serving large farming areas.

* * * *

The Future of the Netherlands Railways

In an address which he gave on March 8, Dr. J. Goudriaan, Chief General Manager, Netherlands Railways, drew attention to the working loss on those lines last year. This, notwithstanding financial reforms, came to fl. 22,500,000. The last ten years had seen a rise in unemployment and a decline in international trade, and these tendencies had badly affected the railways. The uncontrolled bus services running alongside railway routes had, he said, such an unfair advantage that, if such competition continued, the railway management would have to consider closing some sections of line. Dr. Goudriaan emphasised that endeavours had to be made to increase receipts by stimulating traffic, so long as this did not lead to a disturbance of the whole system of fares, and he went on to say that the first step had already been taken by introducing evening return tickets. The programme for the future included a speeding-up of trains, more frequent services, and smaller train units. Receipts from goods traffic last year were fl. 40,000,000, fl. 15,000,000 less than from passenger; they would have been higher had the railways been allowed to fix rates before 1934. There was no longer an economic foundation for basing freight rates on classes of goods carried, and a rating system based on weight or space ought to be framed. The railways were pursuing a policy of co-operation with the road services.

* * * *

A.T.C. on the German State Railway

The remarkable progress made by the Reichsbahn in installing its very complete inductive system of A.T.C. will be evident from the short article and map on page 581 in this issue, the particulars in which are taken from a very informative and detailed series of articles which Reichsbahnrat Krauskopf has been contributing to *Der Bahn-Ingenieur*. No other European railway administration has done so much to develop a complete system, covering all the requirements called for by its methods of signalling and train working. No expense has been spared in experimenting with various designs of equipment, and the apparatus on the trains is of the highest class in such type of work. The map accompanying the article shows that long stretches of the most important main routes are now fitted, with the large number of about 12,000 track magnets. Not content with applying the A.T.C. to the ordinary signals, the Reichsbahn has adapted it to the checking and enforcement of temporary speed restrictions and to proving that level crossing barriers have been duly closed ready for the approach of a train. The design and development of the constructional details has been carried out in association with well-known signalling and braking firms and all concerned are to be congratulated on the results of their efforts.

* * * *

A German Signalman's Carelessness

An instance of how carelessness can defeat the most complete safety measures is shown by an accident on the the Reichsbahn, reported in the *Zeitschrift für das gesamte Eisenbahn-Sicherungs- und Fernmeldewesen*. Owing to the spectacle plate on an old design of semaphore signal getting caught on something, the signal could not be restored to the " stop " position. The signalman, however, by exerting great force on the lever, the necessity for which should have been enough to warn him that something was wrong, succeded in straining the double-wire transmission sufficiently to return the lever to normal. The signal arm not being normal prevented the transmission of the a.c. block current to clear the section in rear, the block line circuit being open at a contact-maker on the signal, always fitted in Germany to provide what we call " proving." The man thereupon apparently reported that the block had failed, for the supervisor who controlled him—an official who is found at all but the very smallest stations—without first seeing for himself that the home signal was properly at " danger," or supplemented by a temporary platelayer's signal, as the rules required, gave telegraphic permission for another train to enter the section. The driver took the faulty signal as " off " for him and ran into some vehicles that were being shunted. Both men were to blame.

* * * *

French Steam Locomotive Developments

Several steam locomotive experiments of outstanding interest are under way, or will shortly begin, on the French National Railways. The Velox-boilered streamlined 4-6-0 engine has been mentioned in these pages already, but recent trials have included the haulage of 580-ton trains (*rapides* Nos. 609 and 618) between Paris and Laroche. Two locomotives with a boiler pressure of 725 lb., one of 1,000 h.p. and one of 2,000 h.p., are being built by Bugatti for experimental operation on fast light trains. The original intention was to have multi-cylinder engines driving the wheels through gears; as now being built, however, the cylinders will drive the axles direct, but the torque is to be transmitted to the wheels through a form of individual axle drive. A 4-6-4 streamlined turbine locomotive is being built by Schneider, and test runs are expected to begin in the summer. Each power axle is to be driven through elastic gears by a separate twin-shaft turbine, one shaft being for forward drive and the other for backward motion. The top speed will be 10,000 r.p.m., at which the output will be 1,000 h.p. per shaft with the boiler pressure of 365 lb. per sq in. The boiler is to be of the ordinary type, of special steel, and double-chimney Kylchap exhaust arrangements are being fitted. Finally, a 4-6-4 locomotive with a water-tube boiler working at 870 lb. per sq. in., and small high-speed engines driving the 61-in. wheels through gears, has been completed for tests in the Northern Region.

A False Clear Automatic Signal

A collision occurred on September 11, 1938, fortunately at low speed, between two passenger trains on the Chicago, St. Paul, Minneapolis & Omaha line near Valley Junction, Wisconsin, not far from where the connecting line from the Chicago North Western joins the St. Paul. According to the official investigation, summarised by our contemporary *Railway Signaling*, the second train received a false clear " proceed " indication at a three-position automatic semaphore signal, which went to the " on " position when passed by a train but cleared again fully while one of the controlling track circuit sections was still occupied. It was found that the two relays controlling the " caution " and " proceed " positions of the arm could pick up in these circumstances owing to some line wires becoming twisted together by the wind, and shorting because their insulation was frayed. False clear signals in automatic signalling installations are very rare, and the precaution of " proving " can be taken in certain forms, although no importance is attached to this precaution, as a rule, in America. In spite of certain safeguards, however, there must always be a small risk of false signal working against which careful maintenance alone can afford decisive protection.

* * * *

Boiler Scale

A very good case can be made out for treating locomotive feed water, and indeed for any means of minimising the scale deposited upon the tubes, firebox and other parts of the boiler. Emphasis was laid upon this matter by the author and one of those who took part in the discussion on a paper read before the Institution of Locomotive Engineers, entitled " Economical Locomotive Running-Shed Operation." The author, Mr. G. M. Pargiter, said that the importance of regularly washing out boilers cannot be too heavily stressed. By keeping the barrel thoroughly clean, some 75 per cent. of the common defects met with can be prevented because the formation of scale therein, as well as in the waterways, is the root of the evil. It is responsible for the wasting and burning of plates, leakage of tubes, stays and riveted joints, as well as internal pitting and corrosion. In the course of the discussion one of the speakers, Mr. J. W. Hobson, said that when locomotives came in for repairs their condition was often such that he considered it a miracle that the boiler had not blown up. It was a not uncommon experience to find hard sediment 2 in. thick on the top of the firebox, and the boiler barrel so full of scale that it was almost impossible to withdraw the tubes. On occasion the quantity of sediment and other impurities removed from a single boiler would more than fill a cart.

* * * * *

Bull-Head versus Flat-Bottom rail

One of the advantages of bull-head track is the ease with which rails of this type can be laid. To remove them from the track it is necessary only to take off the fishplates, knock out the chair keys and the rails can be lifted out and with equal simplicity replaced. Most flat-bottom track is fixed to the sleepers by spikes or coach screws, either direct or through soleplates, and to remove such rails it is necessary to draw the spikes or remove the coach screws on one side of the rail and loosen them on the other. When the new rail is placed in position the spikes and screws have to be reinserted, which generally means additional holes in the sleeper, thus weakening it. This complication is, however, obviated when the rail is fastened independently to the soleplate. Another advantage of bull-head rail is that, its section being more nearly symmetrical, it is less liable in rolling from the ingot to develop defects. This advantage has been reflected by the comparatively small number of rail failures on British railways compared with railways using flat-bottom rails. Nevertheless, improved methods of rolling, and better composition of steel are tending to neutralise this advantage of the bull-head rail. In favour of the flat-bottom rail, the principal claim is that it is stiffer laterally and therefore the maintenance of good track alignment is easier. Further, with the modern tendency to weld rails into long lengths so that they cannot expand or contract in accordance with variations in temperature, this greater lateral strength is an important advantage in minimising the risk of buckling.

* * * *

The Herbert Jackson Prize

The L.M.S.R. has just announced the award of the Herbert Jackson prize for 1938 to Mr. J. N. Bradley, an Assistant Metallurgist in the company's research laboratory at Derby, for his paper entitled " The Separation of Mixed Gunmetal and White Metal Borings." A Jackson medal has also been awarded to Mr. C. W. Newberry, Research Assistant in the engineering section of the same laboratory, for a paper entitled " An Investigation into the Occurrence and Causes of Locomotive Tyre Failures." As recently as in our issue of February 24 last (pages 291 and 329) we published illustrations of the obverse and reverse of the medal and outlined the circumstances in which the Herbert Jackson prize was established. It is awarded annually by the L.M.S.R. in memory of the late Sir Herbert Jackson, K.B.E., F.R.S. (an original member of the L.M.S.R. Advisory Committee on Scientific Research), to a member of the company's research staff for the best written account of an investigation carried out in the company's laboratories during the year. As Sir Herbert Jackson played an invaluable part in guiding the earlier work of the committee, from 1930 until his death in 1936, and especially in encouraging the many members of the company's scientific staff with whom he came into contact, the directors felt it would be appropriate to perpetuate his memory in this way. The 1938 awards are the second to be made.

* * * *

Sacré Nom d'un Nom!

It was not for the first time by any means that we squirmed in our chair, on hearing a broadcasting gentleman introduce into his context an express train which he styled the " Flying Scot." Strange it is that our savants of radio, stage, and literature, in their desultory outbursts of " railwayising," nearly always drag in this distressing hybrid, and equally strange that they have spared us the logical collateral " Royal Scotsman " and other enormities such as " Coronation Limited " and " West Riding Jubilee "—so far. Nevertheless, one error of this kind is sufficiently regrettable and is symptomatic of the queer deal meted out to our railways in this enlightened age. For we maintain that, were a person publicly to talk about the *Mauretanic*, or in like manner to desecrate the revered names of racing-cars, speed-boats, and aeroplanes, newspapers would have to issue a correspondence supplement to accommodate a small percentage of expostulators' tirades; whereas, any unwitting soul can blithely discourse or effuse about impracticable journeys by apocryphal trains, hauled by never-existent locomotives at antediluvian speeds, in addition to perpetrating elementary blunders in nomenclature, and can get off " Scot " free. Sad, but true, and all we can do is to murmur Byronically: " Ivatt, Deeley, Whale, alike forgot, resign their hallow'd bays to ' Flying Scot.' "

XUM

Co-ordination in South Australia

SOUTH AUSTRALIA, like most other countries, has been confronted with the serious problem arising out of the rapid development in the use of motor vehicles on the roads and the consequent prejudice to the traffic of the Government Railways. As early as 1926 the question became acute and a Royal Commission made certain recommendations, but in 1930 it became necessary to revise the position afresh, aggravated as it was by the full onslaught of the industrial depression. Another commission was appointed and a Transport Control Board was formed, which is still in office. This scheme of control has now been in operation for eight years, and in the course of that period the State has emerged from the great recession of business from which it was suffering when the Rail and Road Transport Act came into operation. It has become apparent that some of the hopes for the improvement of the position of the railways which were expressed when the Act was under consideration in 1930 have not been fulfilled. For some years the railway authorities have been asking for more stringent regulation of competing road transport in order further to protect railway revenue, while on the other hand complaints are heard from primary producers, business men, and other road users, against the restrictions imposed by the Act. The number of motor vehicles has increased from 757 in 1920, to 13,764 in 1929, and to 23,741 at the end of August, 1938; the last-named figure is made up of 292 commercial passenger vehicles and 23,449 goods vehicles. In these circumstances it was decided that the time was ripe for a new inquiry and a Royal Commission was appointed by the Government on July 21, 1937, to consider (*a*) if it is desirable to control by law the transport of passengers and goods by road, by rail, and by air, and (*b*) whether the control at present exercised under the Road and Railway Transport Acts 1930-31 shall be abolished or altered. The commission, presided over by Mr. Geoffrey Sandford Reed, issued its report on November 11, 1938, and copies of the full text are now to hand.

The first consideration is the position of the South Australian Government Railways. The loan liability upon which the Railway Department is charged interest is £27,827,804, and with other loans the total invested by the State in its railways is £31,980,174. To the extent to which the earnings fail to meet operating costs and interest, the loss becomes a burden on the State and must be met by taxation. Records show that the average burden on the taxpayer of the railway deficits was about a million pounds per annum from 1932 to 1938. The estimated effect of road competition is shown by figures given in the report. In 1924-5, a record year, passenger receipts were £1,114,558. In 1937-38 they had fallen to £572,584, in spite of the increase in population. Similarly, under the head of goods traffic, receipts fell from £2,673,353 in 1926-27, to £2,361,096 in 1937-38. The drop in goods traffic is not so marked as that in passengers, but the commissioners considered that, if the railway traffics had increased in proportion to the increased industrial activity, the average annual tonnage would have been approximately 850,000 tons more than that of the period 1912-21, instead of which it was less by 270,000 tons. At the same time railway working expenses steadily increased, and, while earnings have improved since the depression, expenditure has risen in greater ratio. Receipts for 1937-38 show an increase of £554,343, compared with 1933, but working cost increased by £762,239 in the same period, and the ratio of expenditure to receipts has risen from 77·93 per cent. to 87·94 per cent.; the increase in the working ratio has been more pronounced in South Australia than in any other State. The commission of 1930-31 recommended the establishment of a directorate control over the railways, and the present commission is of opinion that the reasons which led to that recommendation apply equally today, and that the necessary Bill should be reintroduced without delay.

The report deals in considerable detail with the question of receipts and cost of working road motors, and the commission arrived at certain conclusions as to when road competition with rail is successful. As a general conclusion it is found that control or regulation by law of transport within the State is absolutely essential in the public interest, and that this control must include a degree of regulation of the competition of road motor transport with the State Railways. Evidence taken from all sections of the community led to the conclusion that the present system of control, as exercised by the Transport Control Board under the Act of 1930-31, has failed, and there is a partial breakdown of the system. The absence of any restrictive control of the use of the private commercial vehicle, or " ancillary vehicle," has led to practices which seriously compromise the efficacy of the system, while a different series of evasions has had a similar effect in the case of passenger transport. The commission therefore considers that the control should be tightened up, while at the same time more effective measures of co-ordination should be imposed. Some payment may still be required from road transport services in return for monopoly protection. A draft Bill is published as an appendix to the report of the commission, and the scheme recommended proposes that control by the Transport Control Board, and the system of controlled roads, should continue. The Bill provides for some variation in the licensing of vehicles, general regulations, and penalties for infraction. The members of the board will continue to be three in number and non-representative. They will be vested with certain powers over competitive railway transport, while air transport will now, for the first time, be brought under the control of the board. In general terms the actuation of the present Transport Board is confirmed and approved, and the effect of the report of the commission and the proposed Bill will be to continue the present system, to strengthen the powers of the board, and tighten up the regulations. At the same time a greater measure of co-operation is recommended between the board and the railway department. The commission makes special mention of the services rendered by Mr. John Sincock, who has been Chairman of the Transport Board since its inception, and largely responsible for the application of the policy laid down in an Act which was the first of the kind in Australia.

* * * *

Report on Indian Railways for 1937-38

DUE to a slight average defect in rainfall, and to other causes, the agricultural season in India during 1937-38 was not entirely favourable. Wheat and oilseed crops were, however, satisfactory, and gross traffic receipts of State-owned railways for the year amounted to Rs. 95·01 crores,* as compared with Rs. 91·79 crores in 1936-37. After meeting depreciation and interest charges, the net result of the year's working was a gain of Rs. 276 lakhs. This surplus was credited to central revenues. On all railways there were appreciable improvements in both passenger and goods traffics. Passenger earnings increased from Rs. 29·37 crores in 1936-37 to Rs. 31·08 crores in the year under review. The corresponding numbers of passengers carried were 489·6 and 521·3 millions, respectively, an increase of roughly 32 millions; passenger-miles rose from 17,785 to 18,847 millions. Goods tonnage increased

* Rs. 1 crore = Rs. 100 lakhs = £750,000

from 82·4 millions in 1936-37 to 87·3 millions in 1937-38, the relative earnings being Rs. 67·33 and Rs. 68·66 crores. Net ton-miles rose from 20,789 to 22,777 millions, but the average rate per ton-mile earned fell from 6·21 pies* to 5·78 pies, or approximately 6½d. The total route-mileage of all railways at the end of the year was 41,076, 35 miles of new line having been constructed—all in Indian states—and 37 miles closed to traffic; additional movable *ghat* (river station) approach lines, diversions, and realignments, however, effected a net increase during the year of 45 miles. The operating ratio of all State-worked lines excluding depreciation was 52 per cent., or 65 per cent. including depreciation; these figures were the lowest since 1929-30. March 31, 1938, saw the close of a year which produced goods earnings on State-owned railways in excess of those during 1928-29, the peak year, also the highest earnings from coal traffic since that year, and on the Bengal-Nagpur and Bombay, Baroda & Central India Railways higher total receipts even than in that peak year.

Job-analysis investigations were continued on both State-worked and company-worked lines. Results varied widely on the different systems, but the best were achieved by the North Western Railway, on which Rs. 60,855 expended on job-analysis organisation effected savings totalling no less than Rs. 27,26,106 during the year under review. On this railway 18 locomotives, 18 boilers, 142 coaching units, and 201 goods units were condemned without replacement, as a result of better vehicle user, representing some Rs. 30,00,000 reduction in capital at charge. Train-mileages were increased on all gauges as the following table shows:—

Train-miles	Broad gauge Increase Per cent.	Metre gauge Increase Per cent.	Narrow gauge Increase Per cent.
Passenger	4·26	8·70	2·51
Goods	8·05	3·01	5·79

Almost all railways reported increases in train speeds during 1937-38, and the quicker transport of "smalls" was a speciality on nine railways, effected by reorganisation of system and the running of additional fast van-goods trains. The improvement in wagon user was marked, the wagon-miles per wagon-day rising by 4·1, and the net ton-miles per wagon-day by 43 on the broad gauge class I lines. As illustrating measures by railways to foster industries, it is mentioned that the surcharge on coal was reduced from 15 to 12½ per cent., with a maximum of Re. 1, a measure costing the railways Rs. 20,00,000 a year. Some 75,000 tons of rails and fish-plates were purchased from the Tata Iron & Steel Co. Ltd., and Rs. 35,00,000 were expended on the purchase of timber for carriage and wagon building, and Rs. 1,03,00,000 for sleepers. The most important engineering construction work completed during the year was the King George VI bridge on the Assam—Bengal Railway, already described and illustrated in these pages.

The position with regard to rolling stock is shown by the following table:—

	Scrapped during 1937–38	Replaced by new vehicles	Reduction in number
Locomotives—			
Broad gauge ..	83	4	79
Metre gauge ..	58	27	31
Coaches—			
Broad gauge ..	488	297	191
Metre gauge ..	368	308	60
Wagons—			
Broad gauge ..	2,174	2,115	59
Metre gauge ..	1,445	731	714

* 1 pie = $\frac{1}{12}$ anna = roughly, $\frac{1}{12}$d.

In the course of the year the average tractive effort per locomotive rose from 25,862 lb. to 25,972 lb. on the broad gauge, and from 14,756 lb. to 14,818 lb. on the metre gauge systems. In the period under review, the following rolling stock, including arrears brought forward from previous years, was ordered:—

	Broad gauge	Metre gauge
Locomotives	34	38
Coaching vehicles	753	682
Goods ,, ...	2,132	2,222

From the chapter of the report devoted to the subject, it is seen that there are 10 railway-owned collieries in India, 3 belonging to the State Railways, 2 jointly owned by the East Indian (State) and Bengal-Nagpur Railways, 2 by the Bengal-Nagpur Railway, 1 by the Madras & Southern Mahratta Railway, 1 by the Bombay, Baroda & Central India Railway, and 1 jointly by the M. & S.M. and B.B. & C.I. Railways. The combined output during the year was 3,860,987 tons. One of the State Railway collieries reports that its coke bye-products plant produced the following materials during 1937-38: Coke 55,139 tons, coal tar 2,050 tons, sulphate of ammonia 534 tons, benzol 58,848 gallons, and rectified solvent naphtha 3,210 gallons.

On March 31, 1938, the payrolls showed that there were 692,178 employees in service on all the railways, of whom 2,692 were Europeans, and 12,843 were Anglo-Indians or domiciled Europeans. These figures exclude construction staff. The total cost of salaries and wages during the year on Class I railways was Rs. 35¼ crores. In addition to the Bihta disaster there were seven other important accidents during 1937-38, but only 105 passengers and 18 railway servants lost their lives "in accidents to trains, rolling stock, permanent way, &c." As 106 persons were killed at Bihta, the total deathroll in all other accidents, of passengers and staff, was only 17, of whom 11 were employees killed in the other seven important accidents. The numbers of passengers killed and injured per million passengers carried were 0·19 and 0·32 respectively. At the beginning of Volume 1 of the report are 14 pages of illustrations, mostly full-page plates; they include the latest Bengal-Nagpur Railway 4-6-0 type locomotive, the King George VI bridge, the interiors of the two different types of air-conditioned coach, various stations, and a folding plate of Naihati hump yard, Eastern Bengal Railway.

* * * *

A "Square Deal" for the Belgian Railways

THE last two of a series of conferences organised by the Belgian Railways administration were given by M. Rulot, General Manager of the Belgian National Railways Company, at La Louvière on November 22, and at Courtrai on December 12, and the full text in French has now been published. The object of the conferences was to make public the difficulties of the position through which the National Railways are passing and the remedial measures that are being adopted. The results of working have shown a deficit for some time past, and the accumulated shortage now amounts to 400 millions of francs. The year 1937, a progressive industrial period, produced a loss of 28 millions, and the deficit for 1938 is expected to reach the alarming figure of 250 millions, which may probably be exceeded in 1939. The causes of this are not far to seek. The obligations imposed by the Law of August 25, 1891, at a time when railways enjoyed a monopoly of transport, are unduly onerous in these days of higher costs and road competition. Discussing possible remedies, M. Rulot referred to the proposal that the State should relieve the company of the financial burdens which

now bear so heavily on it, such as transport for the State, pensions that are a legacy of the period of State control, and the cost of compulsory capital improvements. Even if relief were afforded in respect of these burdens the deficit would not be nearly covered, and recourse must be had to a reduction in working expenses or an increase in tariffs. Working costs could be reduced only by withdrawing services, a retrograde step. Nevertheless, a plan is already under consideration for simplifying working of unremunerative lines.

There is also the question of raising revenue through an increase in tariffs, and this would involve a reform in the tariff structure. In passenger bookings an extensive adjustment is proposed in return and special fares, as well as in season and workmens' tickets. In merchandise tariffs the structural reform was also explained in detail. Describing the proposals, M. Rulot said that rail charges had always been based on the value of the merchandise transported; the road vehicle had broken with this convention with results that might be disastrous if a remedy were not found. The Belgian railways had resolved to introduce an element of elasticity in their system of charging. He outlined an extensive scheme of reform, and referred particularly to two fixed scales of prices, "A" and "B," for all merchandise below the five higher classes. The prices of Scale "A" would remain unaltered, while for those of "B" an increase of 10 to 15 per cent. is suggested. Scale "A" prices would apply to traffic of all classes shipped by clients who undertake to carry the whole of their goods by rail. These prices might also be applied in the case of clients guaranteeing an agreed minimum tonnage. Other applications of these scales might be considered. It is hoped that this extensive tariff reform would produce the necessary additional revenue, but should these measures not have the desired result the company would find itself obliged to impose a general increase in charges of from 10 to 20 per cent., and to exercise radical measures of economy in working, establishment and renewals.

As regards the possibilities of co-ordination, which formed the subject of the Courtrai conference, M. Rulot pointed out, with a wealth of convincing detail, that the problem is not merely a railway problem but one which concerns the whole nation. The State is the principal shareholder in the railways, and rail communication constitutes the most important factor in the economy of the country. It is in the interests of the nation that the railway system should not fail in its mission of public service. It must not be allowed to become a greater burden on the taxpayer. The principle of charging what the traffic will bear has been challenged, but it cannot be abolished, and M. Rulot considers that the only solution is the establishment of an authority of co-ordination over all forms of transport, and the introduction of a general uniform system of charging applicable to all systems of transportation.

* * * *

American Locomotive Inspection Statistics

THE annual report of the Bureau of Locomotive Inspection, Interstate Commerce Commission, which was recently issued, covers the fiscal year ending June 30, 1938. It is in many respects an encouraging document in that the number of locomotives inspected was substantially increased as compared with the previous year, whilst the number of those found defective was smaller, as was also the number of locomotives ordered out of service. The total number of defects which came to light showed an appreciable drop. The figures given in the report relate mainly to steam locomotives, and the number of these inspected during the year referred to was 105,186, of which 11,050 or 11 per cent. were found defective and 679 ordered out of service. In 1937, when there were 100,033 inspections, 12,402 engines were found defective, and 934 of these were ordered out of service. An examination of these figures shows that for the year ending June 30, 1938, there was an increase in locomotives inspected of 5,153 and a decrease of 1,352 in the number found defective. Those ordered out of service were fewer by 255 than in the previous year, and to complete the comparison, there was a decrease of 7,532 in the number of defects found.

The total number of accidents caused by the failure of some part of a steam locomotive, with the number of persons killed or injured, also showed a favourable turn. There was a decrease of four in the number of accidents and of twelve in the number of persons killed. Those injured as a result of boiler explosions or firebox crown plate failures were seven fewer compared with the previous year. The five explosions occurring in the period covered, in which five persons were killed and three injured, were caused by the overheating of the crown plate of the firebox due to low water. This is the smallest number of explosions experienced in any one year ever recorded, with the exception of that ending June 30, 1933, when the same number of explosions occurred and resulted in the death of two and injury to six persons. Boiler and appurtenance accidents other than explosions resulted in the injury of 56 persons. Compared with the previous year (1937) this is a reduction of two persons killed and four persons injured in accidents originating from failures of these parts. There was a decrease of eight in the number of accidents in connection with locomotives other than steam, and a decrease of ten in the number of persons injured compared with the previous year. During the year 7 per cent. of the locomotives inspected were found with defects or errors in inspection that should have been corrected before they were put into use, and these compared with 9 per cent. in the previous year. There was a decrease of 15 in the number of locomotives ordered out of service because of the presence of defects.

LETTERS TO THE EDITOR

(The Editor is not responsible for the opinions of correspondents)

Locomotive History in Models

The Science Museum, South Kensington, S.W.7,
March 27

TO THE EDITOR OF THE RAILWAY GAZETTE

SIR,—I have read with great interest your editorial note on page 450 of THE RAILWAY GAZETTE of March 17, entitled "Locomotive History in Models," in which the suggestion is made that concerted action should be taken to inaugurate a collection of scale models of locomotives.

As you know, the Science Museum aims at building up a collection of models specially selected to show the development of the steam locomotive and considerable progress has been made in the case of early models; the series now include models of such famous early engines as Blenkinsop's rack locomotive, Stephenson's Killingworth locomotive, and the *Novelty* of Braithwaite and Ericsson; a model of Stephenson's 2-2-0 *Planet* of 1830 is under construction at the moment.

The earlier locomotives are less complicated and comparatively inexpensive to construct in model form, but recent types are more elaborate in design and models of them are costly. A scale model of a modern main-line express locomotive, accurate in detail and possibly sectioned, is beyond the modest limits of the annual purchase grant of the museum. Outside help is essential towards completing the series and keeping it up to date.

Yours faithfully,
G. F. WESTCOTT

PUBLICATIONS RECEIVED

The Taff Vale Railway. By D. S. Barrie. Sidcup, Kent: The Oakwood Press, 19, The Drive. 7½ in. × 5 in. 85 pp. + illustration plates and maps. Price 2s. 6d. in paper covers or 3s. 6d. in cloth.—The Taff Vale Railway Company was incorporated in June, 1836, and was the first public railway undertaking of any great commercial importance in the Principality of Wales. From its earliest days it played an important part in raising the Welsh coal trade to heights of prosperity that today seem difficult to credit, and yet to a large number of railwaymen the name Taff Vale conveys little more than a Welsh colliery line that in 1900 figured in a legal action which became a classic in railway and trade union law. Mr. Barrie obviously possesses local knowledge and enthusiasm that enable him to appreciate what he terms the "traditions and brave associations" of the Taff Vale Railway, and with considerable skill he has outlined its story against the changing background of industrial South Wales. The Taff Vale occupied historic territory, for the upper reaches of its original line between Merthyr and Cardiff traversed the same ground as the Penydarran Tramroad of 1800, which was immortalised four years later by Trevithick's pioneer steam locomotive experiments. The story of the T.V.R. is one of vigorous expansion, fiercely-fought competition, and considerable commercial prosperity (17½ per cent. in 1882), before grouping submerged its individuality into "a vast rationalised railway industry bound neither by the ties of local patriotism nor by the urge of native interests." Nevertheless, the author is a realist, and in a brief concluding note points out that grouping proved the salvation of the South Wales lines by causing larger shoulders to bear the burden imposed by the industrial slump that overwhelmed the industry of the South Wales mining valleys.

Pioneering Days on the Hill Section of the Assam-Bengal Railway. By Mrs. F. S. Wilde. London: Assam-Bengal Railway Co. Ltd., 56, Victoria Street, S.W.1. 9¾ in. × 6¼ in. 59 pp. Price 6s. net.—In this little volume Mrs. Wilde has painted a true picture of typical experiences met with on most railway surveys in hilly jungle country in India or Burma. The greatest difficulties encountered are not connected with the actual survey work—though that is no child's play where large tracts of forest prevent one from obtaining any views of the country, and bamboo thickets are sometimes so dense that they have literally to be tunnelled—but are due to lack of labour and supplies. An engineer's wife who is physically and temperamentally suited to the genuine hardships that have to be faced on surveys in the back-of-beyond is a real help, not only to the officers but to the coolies and to the railway or to Government, as the case may be. She can attend to the commissariat and care for and reassure the sick (for the coolie usually has little faith in the doctor *babu* detailed to each survey party), and she can sometimes help in the work, as, for instance, by taking a series of half-hourly barometric readings throughout the day in camp, for plotting the diurnal wave. She is, therefore, an "unpaid hand," and where conditions are reasonably possible for her to accompany her husband, it is short-sighted of authority to frown at the idea. The work under review tends to confirm this opinion, and it is a pity that, instead of being of the "short story" variety, embracing only part of a survey season's work, Mrs. Wilde's narrative was not expanded into a volume containing six years' experiences of survey and subsequent construction on the hill section.

Influence Lines: Their Practical Use in Bridge Calculation. By David S. Stewart. London: Constable & Co. Ltd., 10, Orange Street, W.C.2. 9 in. × 5¾ in. 215 pp. Illustrated. Price 12s. 6d. net.—This book begins very sensibly with the definition that "an influence line is a curve or graph representing some function, such as reaction (shear, bending moment, or stress, etc.), which occurs at a particular point or section on a span as a load passes over the span." In bridges where the deadweight of the structure predominates enormously over the travelling load the design turns mainly on the distribution of this deadweight, but most railway bridges fall into the class that is affected to a much greater extent by the traffic passing over. This book, therefore, though stated to be suitable for civil engineers, structural engineers, municipal and county engineers, and students, is pre-eminently suitable for railway engineers. For the use of students it could be improved by the inclusion of some exercises. However, the reader who can be trusted to verify the progress of his understanding in his own way is provided with the means for so doing. On a transparent sheet (that also serves as a book-mark) can be traced the diagrams of structures in the book. These are all drawn to the same scale. The tracings can then be laid on a sheet of squared paper provided at the end of the book, and appropriate influence lines can be plotted without reference to the text. The correctness and accuracy of the plotting work can be checked by reverting to the worked examples on the structure under investigation.

A Yearbook of Railroad Information—1938 Edition. New York: Committee on Public Relations of the Eastern Railroads, 143, Liberty Street. 96 pages. Free.—The new edition of this annual pocket-size booklet, the object of which is to present readers with facts and figures regarding the operation and finances of the American railroads, gives one an idea of the financial crisis these lines are now facing. Almost one-third of the railroad mileage of the United States is now bankrupt, yet the managements are zealously carrying on the policy of improved efficiency and economy they have pursued during the last ten years of depression and increasing competition. Facts and figures are given on left-hand pages, with appropriate graphs showing a comparison of 1938 with other years on opposite pages. British students of railway matters will find this booklet a useful complement to the annual booklet of the British Railways Press Bureau, "Facts about British Railways."

Summary of Standard Steels.—We have received from English Steel Corporation Limited, of Vickers Works, Sheffield, a copy of the latest edition of the firm's above-mentioned catalogue, in which information relating to some of the firm's steels is to be found. In the tables which make up the catalogue, in addition to the standardised chemical analyses and some typical applications, there is given for each steel a range of mechanical properties after a specified heat-treatment.

Guided Ram Stamps.—Leaflet No. 4380H, of B. & S. Massey Limited, Openshaw, Manchester, describes a series of double-acting steam or air stamps of the guided ram type. This principle of construction imparts the added strength and reliability demanded by the severity of modern production conditions. It is pointed out in the publication that double-acting stamps of this type have a blow energy equal to a drop stamp of the same nominal size, but for less than half the length of stroke. Dimensions of the rams range from a 5-cwt. size with a 10½-in. tup, to a 100-cwt. ram having a tup measuring 31 in. front to back.

Metal Rectifiers.—The first of five publications we have received recently from the Westinghouse Brake & Signal Co. Ltd., York Way, N.1, is entitled "At the Correct Rate" and describes the firm's battery chargers. Many models for various purposes are described and illustrated, including the new R.G.C. 14 charger for radio and car batteries. A useful feature is a chart showing the range of models and their prices. Booklet D.P.11 describes the Westinghouse copper-oxide metal rectifier, some of the many applications of which are given therein. Booklet D.P. 11e is devoted to Westinghouse chargers for electric vehicles and trucks. In view of the fact that for "runabout" duties with light loads the hand-barrow and the horse and cart are fast being supplanted by the battery-operated electric unit, this booklet will be read with interest by retail distributors. Metal rectifiers for projector arcs are described in another booklet, and there is a special folder giving details of the Noregg and Westat constant-voltage rectifier systems.

XUM

THE SCRAP HEAP

There is a rumour at the Earl of Dudley's Steel Works that the railway companies are contemplating changing the name of Round Oak station to Square Deal.—*From the "Six Hundred Magazine."*

* * *

On July 18, 1878, the General Manager of the London Brighton & South Coast Railway ordered that during the summer months a supply of fresh cold drinking water should be obtainable at certain stations. The company's refreshment contractor accordingly arranged for platform attendants at Lewes, Horsham, and Three Bridges stations to supply passengers with iced water at a charge of one penny a glass.

* * *

The posts marking out the line of the intended railroad to Orleans were no sooner placed by the side of the Boulevard de l'Hôpital, than the speculators hastened to purchase the adjoining land for the purpose of erecting warehouses; and this quarter of the capital, which has hitherto been almost deserted, will probably soon become populous and wealthy.—*Extract from the "Journal des Débats" of October* 31, 1838.

RAMBLES TO UGLEY AND JERICHO

A new series of conducted Saturday afternoon rambles has been arranged by the L.N.E.R. for April, May, and June, in addition to the Sunday rambles already in operation. The places to be visited include Brackley, Great Missenden, and West Wycombe in Buckinghamshire, Jericho, and the lovely country round Ugley and Welwyn and Harlow in Essex and Hertfordshire. Experienced ramblers will accompany every party, and various rambles have been arranged to suit walkers of all capabilities. The fares from the London termini vary from 2s. to 4s. 2d.

* * *

DUAL ROLE

In the days before the numerous railway companies were amalgamated into four big concerns, and before the greater authorities frowned on the practice, it was not unusual to find that the stationmaster had some other calling, such as village postmaster or coal agent. The other day at Ribblehead, writes a columnist in the *Yorkshire Post*, I discovered that there is still one stationmaster who had two jobs, and the lesser of the two appeared to be the more exacting. Every hour, from eight in the morning until six in the evening, he must prepare a weather report for the Air Ministry. This is sent in code to Lancaster, a public telephone having been specially installed for the purpose. The report may have no difficulties for one on the job regularly, though the particulars required are given under into the teens of headings and deal rather fully with the type and height of the clouds prevailing. But when the S.M. is absent, as he was on a recent occasion, the man sent to provide relief quickly discovered how very little he knew about clouds and weather conditions.

* * *

Eight Cambridge University students, members of the university railway club, have spent part of their Easter vacation visiting important L.M.S.R. and L.N.E.R. centres in England and Scotland. Their tour began on March 18 and concluded on Monday, March 27. Among the places that were visited were Derby, L.N.E.R. sheds; Kingmoor and Upperby sheds (Carlisle); St. Rollox works (Glasgow); Kyle of Lochalsh shed; Inverness shed and Lochgorm works; Perth sheds and signal box; Aberdeen sheds, and St. Margaret's sheds (Edinburgh). Mr. J. R. B. Lloyd, of Trinity College, Cambridge, is the Secretary of the Railway Club.

One Hundred Years Ago

Extracts from the April, 1839, issue of "The Railway Magazine" (afterwards "Herapath's Railway Journal") and the oldest constituent of THE RAILWAY GAZETTE

Railway Society.—The nucleus of a society under the above title has been formed, to be "composed of proprietors of railway shares, and persons otherwise connected with, or interested in railways, for the purpose of promoting the scientific improvement and protecting the interests of those undertakings." A preliminary committee for the purpose of carrying out the above view has been formed. . . . "The original subscribers are to be admitted on payment of an entrance fee of five guineas, and an annual subscription of two guineas, which will entitle them at all times to have access to the rooms of the society, and the library, maps, models, and other objects of interest which may be collected." We need not observe that we think some society to protect the vast interests of railway companies, in which so many millions of money are embarked is needful.

London & Croydon Railway.—With regard to the earthwork the whole of that part of the line from Croydon to the Dartmouth Arms, five miles and a half is completed, and the ballast nearly all laid. At the other end of the line, *viz.*, from the junction with the Greenwich Railway, near Corbet's-lane, along the main embankment through the New-cross cutting and as far as the shallower part of the Forest-hill cutting, two miles and three-quarters; the earthwork is also finished; the length of the ballast remaining to be done along the whole line is about two miles. For the last five weeks the laying of permanent way has been proceeding with renewed energy.

Birmingham Railway.—On the resignation of Mr. Baxter, Mr. Baxendale, a gentleman, we understand, every way equal to the discharge of such extensive duties, has been appointed to the whole out-of-door management of the traffic and other affairs belonging to the railway. It has been reported to us that the company have increased their time to Birmingham to 7 hours, that is, at the rate of only 16 miles an hour. We hope this is not the fact, or if it is that it is only for a short period. When this line was about to be opened the public was told we were to have nothing less than 25 miles an hour, and 30 were talked of. If we are now to be reduced to the (for a railway) jog-trot of 16 miles an hour, wherefore having 5½ millions of money to be spent? In 10 hours coaches have done, and can do, the distance on the present roads; and if only one-twentieth of the cost of the Birmingham company was laid out in improving them, we think it might be done in 8 hours, if not in 7, that is, the very time of this renowned line.

Brighton Railway.—March 19, the engine on the Shoreham branch commenced running from the Hove cutting to Southwick, a distance of 3½ miles, to the satisfaction of a large concourse of spectators. It took 27 loaded wagons for the embankments there, at the rate of 20 miles an hour. The weight of the loaded wagons exceeds 100 tons.

The Thames Tunnel.—This undertaking continues to make very satisfactory progress. Since December last 30 ft. of the tunnel have been completed, making the length of it up to the present time of 855 ft. It is now advanced about 130 ft. beyond the situation of the old shield, and to within 65 ft. of low water-mark on the Wapping shore.—*Times.*

Newcastle & Carlisle Railway.—The mail is now conveyed twice daily between Newcastle and Carlisle; and this railway is adopted as the shortest route, in point of time, to and from the Metropolis, Liverpool, and Manchester, and most parts of the populous manufacturing districts on the west side of the island. Persons quitting Newcastle on one evening are enabled to reach London on the following; being conveyed from Carlisle by coaches to Preston, where they join the London train.

OVERSEAS RAILWAY AFFAIRS

NEW ZEALAND

Busy Workshops

Both in the North and South Islands the railway workshops have been particularly busy in turning out passenger and goods stock and other railway equipment. There is under construction at the Hillside workshops a series of 16 "K" class locomotives. Four have been laid down, and it is hoped that the first will be completed in March and that the rest will follow at the rate of one in every six weeks until the programme is finished. This is in addition to 25 "K" engines now under construction in the North Island and those that are being imported from England. The necessity for importing locomotives from abroad was due to the fact that they were urgently required and there was no possibility of building them in New Zealand sufficiently quickly. The same remark also applies to 10 railcars which are being imported, the first to reach here about the end of July next year. The imported locomotives are, in accordance with the contract, to be landed in New Zealand before December, 1939.

The Hillside shops are also engaged in other important work and have just completed the girders for the Inangahua bridge (Westland), which necessitated the construction of six 100-ft. span girders. There are also under construction there 10 U.B. flat-top bogie wagons, and four 70-ft. turntables.

For the Air Force

The Railways Department is working in conjunction with the New Zealand Air Force in regard to the building and equipping of workshops required by the Air Force for the maintenance of its own machines and the training of the personnel on the mechanical side. Space has been allotted in the four major workshops areas, Otahuhu, Hutt, Addington, and Hillside, to provide the facilities required by the Air Force.

Wellington Station Extension

The Wellington station, opened in June, 1937, already requires extension, and work, costing £60,000, is in hand on an addition to the north-west wing. This includes an extension of the cafeteria to the Featherston Street frontage, the enlargement of the kitchen facilities, and necessary improvements to provide for the increased staff necessitated by the growth of the catering business. The extended cafeteria will measure 79 ft. by 22 ft., and provide seating for 48 additional patrons.

The extension will also provide additional accommodation for the traffic staff as well as extra storage room for the refreshment branch. On an upper floor of this extension there will be offices for the District Locomotive Engineer, and much-needed accommodation for other sections of the staff. Other changes provide for accommodation on the second floor for the correspondence school, at present conducted in a detached wooden building.

The extension will have a total length of 226 ft. and a width of 42 ft., and will be a continuation northwards of the existing Featherston Street wing. It will be a three-storey structure, dropping to one storey so constructed as to permit of additional storeys to the full height of the station building if this further extension is required in the future. The contract provides for the completion of the alterations and additions before the opening of the Centennial Exhibition this year.

South Island Main Trunk Line Extension

On the extension of the South Island main trunk line from Parnassus to the northern port of Picton, construction is being pushed ahead and very soon it will be possible to run goods trains for the handling of livestock and wool as far along the southern sector as the Hundalee, many miles north of Parnassus, and in the north as far south as the Clarence river.

East Coast Railway

The East Coast railway extension in the North Island beyond Napier is making good progress, and the Railways Department is now taking over a further section from the Public Works Department; a total of 43 miles from Napier is now under the Railway Department's control. The remaining 30 miles of line between Raupunga and Wairoa are still in the hands of the Public Works Department, but the work is well advanced, and it is expected that this portion of the line will be ready for handing over to the Traffic Branch of the Railways Department in about three months' time. A modified passenger service will then be introduced, using the standard type of railcar, working shuttlewise between Napier and Wairoa. Connections will be made at Napier with the morning express to and with the afternoon express from Wellington, and also with the afternoon train to Palmerston North, which in turn connects with the limited express for Auckland. At Wairoa a further connection will be made by the department's road motor service with Gisborne.

Elimination of Level Crossings

Substantial progress is being made with the programme for eliminating dangerous railway crossings on main highways in rural areas. During the financial year ended March 31, 1938, nearly £300,000 were spent on the elimination of 50 crossings, compared with 15 in the previous year, and since March last 23 more crossings have been eliminated. When the rural elimination projects are well advanced, consideration is to be given to proposals for dealing with crossings in built-up localities, which, due to restricted speeds and protection by automatic warning devices in the meantime, are less dangerous.

[On page 596 we illustrate a typical road bridge replacing a level crossing.—ED. *R.G.*]

SOUTH AFRICA

Additional Estimates, 1938-39

Estimates of additional expenditure for the year ending March 31, 1939, provide for a total vote of £803,080. The principal increases are as follow :—

	Original estimate	Increase
	£	£
Permanent way and works	3,255,325	254,412
Rolling stock ...	4,551,197	39,568
Running	6,227,771	101,543
Traffic	5,523,615	64,052

There were also increases of £20,220 against Superannuation Fund, £50,729 against Road Services, £134,454 against Airways, £43,970 against Catering, and £19,189 against Advertising.

UNITED STATES

New 6-4-4-6 Locomotive for World's Fair

The new Pennsylvania Railroad 6-4-4-6 type locomotive has now been completed at the Altoona shops, and is to be exhibited at the New York World's Fair. It will have the name *American Railroads* on the tender, and, weighing 519 tons with fully loaded tender, will be the largest and heaviest steam passenger locomotive ever built.

Air-conditioned Cars

The steady increase in the number of air-conditioned cars owned by Class I railroads and the Pullman Company is clearly indicated by the following table :—

Number of Air-conditioned Cars in Service on January 1

	1938	1939	Increase
Class I railroads ..	5,564	6,022	458
Pullman Company	4,761	4,955	194
Total ..	10,325	10,977	652

Closing of Railways

During the year ended October 31, 1938, 127 applications were filed for permission to abandon 2,470 miles of line, or to cease operating them. The Interstate Commerce Commission granted 123 applications, of which 51 were contested and 72 uncontested cases. These involved 69 miles of main line and 1,050 miles of branch line, of Class I systems, together with

894 miles of secondary short lines, of which 528 miles constituted the entire systems of the applicants, and 366 miles portions of such lines. The number of miles actually closed is not reported. The estimated aggregate annual losses upon 1,654 miles of line, for which certificates for closure were issued, amounted to $893,777, if operation continued. It was also claimed that closure would save a very heavy expenditure necessary for rehabilitation and on arrears of maintenance essential if the lines were kept open.

Outlook Only Mildly Encouraging

Nothing has yet occurred to encourage the belief that the difficulties of the American railways are to be ameliorated in any fundamental way. Nevertheless, traffics and earnings continue at levels which seem comparatively comfortable after the near-disaster of 1938. In January net operating income (after taxes but before the payment of interest) totalled £6,600,000, which—on an annual basis—would yield 2·4 per cent. on the (undepreciated) capital investment. This would amount to about 3½ per cent. on the combined capital outstanding. In January, 1938, net operating income was but £1,330,000.

Prospects for Passenger Travel

The brightest spot in the traffic situation is the volume of passenger travel foreseen for the summer. The railways have fixed a coach fare of £18 for which a passenger will be transported both to the New York and the San Francisco Fairs, a remarkably moderate figure seeing that the minimum distance any passenger will be carried will be, roughly, 6,000, and in some cases 8,000 or even more miles. The Pullman fare is to be £27, Pullman charges additional.

No "Square Deal" in America

American railway people look with amazement and something akin to envy at the headway the British railways appear, from this distance, to be making with their "square deal" campaign. The legislative programme which the American railways are asking is a much more complex affair than the relatively simple request made by the British railways, and this is one reason, perhaps, why the former is so difficult to "sell" to the American public. And yet, in essence, the treatment the American railways have sought, with respect to their competitors, is certainly no more ambitious than the programme of the British railways. But in America it is unlikely that any assistance will be afforded to the railways by Congress this year. For unless some well-known statesman goes out of his way to sponsor any such programme on the grounds that relief is urgently necessary not in the selfish interest of the railways, but in the national interest, nothing will induce Congress to act.

Moreover, the traders—and especially those associated in the National Industrial Traffic League, who are the most influential—have definitely reaffirmed their opposition to practically all the important points in the railway programme, including any regulation of water-borne traffic, any revision of the railway rates structure, and any revision in the I.C.C. They therefore support the competitors of the railways, and meanwhile the American public is apathetic, and views the whole business merely as a war between conflicting business interests. The railways are thus at the mercy of the general level of business. If there is no recession from present levels, they will probably continue to hold their heads above water, and that is about the best they can expect.

BULGARIA

The State Railway System and its Extensions

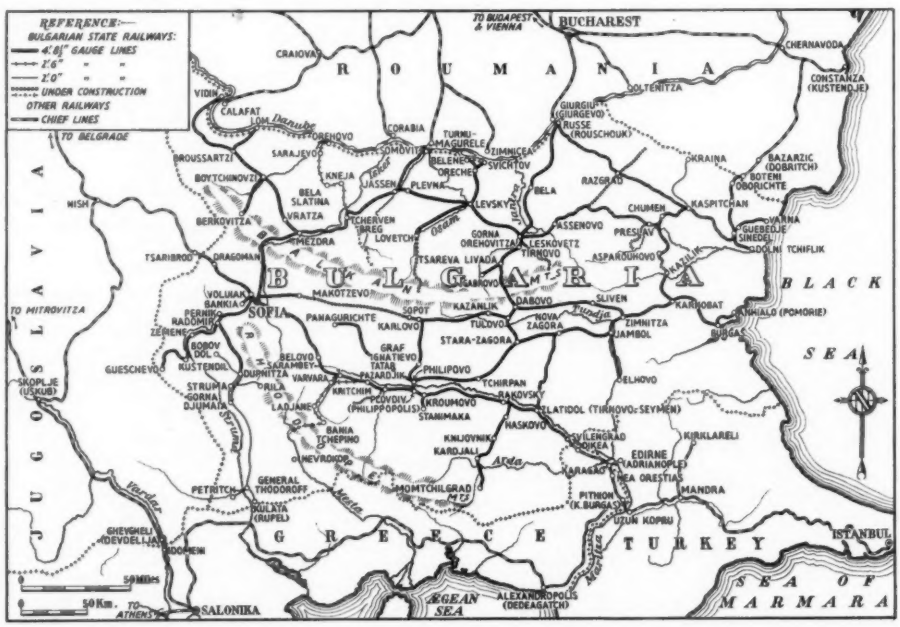
In these days when so much attention is focused on the Balkan States one reads, perhaps, less about Bulgaria in the news than others, unless it happens to be describing the opening of a new line of railway, at which the most railway-enthusiastic of monarchs, King Boris, is sure to be performing the ceremony, probably by driving the locomotive of the inaugural train. As will have been evident from our issue of January 27 last (page 133) such ceremonies have been of frequent occurrence in recent years. The Bulgarian railway system, 2,344 route-miles in extent, as may be seen from the accompanying map, occupies an important position on the route of the Orient Express, and from Sofia, the capital—on this route—radiate lines to Belgrade and western Europe, to the Danube and Roumania (two routes), to the Black Sea, by more than one route, to Turkey and Istanbul and Greece, and to Salonica.

Two Important New Lines

Two of the lines under construction, described on January 27, may also be seen, namely, the standard gauge extension of the Sofia—Makotzevo line eastwards to Sopot, which will complete a new direct route from Sofia to the Black Sea, and Kazilik—Chumen, a north—south mountain line.

General Features of the System

With the Black Sea the only outlet for maritime trade and the principal and formidable mountain ranges running east and west or north-west and south-east, it was almost inevitable that the system should develop mainly as a series of main lines in those directions, mostly to Varna and other less important Black Sea ports. But there are also important cross-connections running roughly north and south and linking up with the Roumanian system by Danube ferries. But all routes centre on Sofia, directly or indirectly. Just about 90 per cent. of the Bulgarian system is of standard gauge, which is remarkable in so mountainous a country.



Sketch map of the Bulgarian railway system showing separately lines of different gauge and new constructions

PROBLEMS CONNECTED WITH LOCOMOTIVE DESIGN—IV

*Presidental address to the Institution of Locomotive Engineers by Mr. W. A. Stanier, Chief Mechanical Engineer, London Midland & Scottish Railway**

THE work of Chapelon has drawn the attention of locomotive engineers all over the world to the importance of internal streamlining of the steam passages all the way from the regulator to the blast pipe, and there is no doubt that the importance of smooth steam flow has been somewhat neglected in the past. The problem is to convey the steam from the boiler on to the working faces of the pistons in the cylinder with negligible loss in pressure, and to get it out of the cylinders after its work is done, and through any given blast pipe with a minimum of back pressure.

Each link in the chain—regulator ports, steam pipes, superheater header and elements, and at the other end, the blast pipe—is a subject for separate study and investigation. Tonight I propose to deal with some experimental work which has been done covering the actual passage of the steam past the valve either into or out of the cylinder.

An inspection of a conventional cylinder and valve arrangement even with straight ports will show that there is at least a possibility that steam flow is not likely to be free of eddies, causing a measure of resistance. It is fairly easy to demonstrate this qualitatively. One such means was to cut out a full size section of the steam port in $\frac{1}{4}$-in. thick rubber sheet and place it between two sheets of glass. Port bars and ribs were reproduced, and by blowing in white opaque vapour the eddies occurring at the various obstructions were readily seen. This was not, however, sufficient. It was necessary to have some means of obtaining a quantitative comparison of the resistance offered by the standard ports and any arrangement of internal streamlining of port bars, ribs, and valve heads which might be thought desirable.

To reproduce full size conditions was considered impracticable under present circumstances, and recourse was had to passing steam through metal models representing standard and streamlined arrangements to a scale of one-third full size. A testing apparatus was evolved by which from certain simple readings the quantity of steam passing through the model in unit time could be calculated. Fig. 12 shows this diagrammatically.

The models are attached to a drum *B* in which any pressure of steam up to 30 lb. per sq. in. can be maintained and observed by means of a pressure gauge. This pressure was selected as representing the greatest pressure difference between steamchest and cylinder met with at ordinary cut-off. In this way we know the pressure difference which is causing steam to flow through the model and discharge into the atmosphere.

In order to determine the rate at which steam is escaping, a drum *A* is used which is supplied with steam from the boiler by a suitable stop valve, and steam passes from drum *A* to drum *B* through a circular orifice of known dimensions. When steady conditions are established it will be seen that the quantity of steam passing through the model is the same as the quantity passing from drum *A* to drum *B* through the orifice, and this quantity depends on the difference of pressure between the two drums. As it is desirable that this pressure difference should not be too great, a fairly large orifice was used and the pressure difference was measured by means of a mercury U tube which is sensitive to much smaller differences than would be the readings of two ordinary pressure gauges.

Models representing both the standard and streamlined ports were tested to represent the conditions of steam entering or leaving the cylinders with four port openings and for three pressure differences of 10, 20, and 30 lb. per sq. in. The method of making the test was to adjust the steam valve leading to drum *A* until the pressure gauge on drum *B* gave the necessary reading. The difference in level of the mercury in the U tube was read and the quantity of steam passing through the model per unit time could then be calculated.

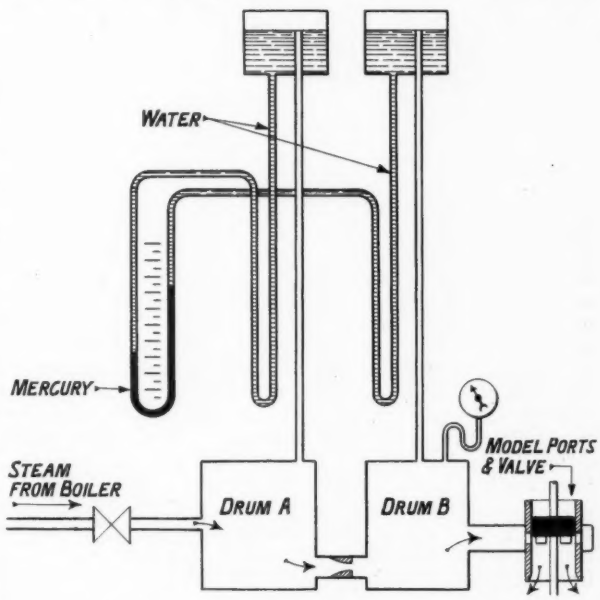


Fig. 12—Testing standard and streamlined ports

The results indicated that reduction in resistance of cylinder ports due to streamlining varied from nil to 18 per cent. in the case of admission, and from 18 per cent. to 37 per cent. in the case of exhaust. It must be observed that this test covers only that part of the total resistance to steam flow which is due to friction. It does not affect, of course, the pressure required to discharge a given quantity of steam from a given size of blastpipe cap. This fact notwithstanding, there seems a possibility of gain in this direction, and certain engines have had their valves and ports modified in accordance with the models. Fig. 13 shows a streamlined piston valve and Fig. 14 shows the steam ports as modified. An exact evaluation of the improvement in efficiency effected on the actual locomotive must await establishment of testing plant now in hand, which will permit of the engine being run under constant speed and load conditions.

Conclusion

In this address I have only dealt with some of the many problems which confront us. Seeking locomotive improvement is like seeking after gold. Old timers in the

* In our issue of February 24, we summarised and commented upon the presidential address presented to the Institution of Locomotive Engineers by Mr. W. A. Stanier. The full address is reproduced by permission in this series of articles, the first of which appeared in our issue of March 17, with illustrations representing some of the lantern slides shown during the actual reading on February 22

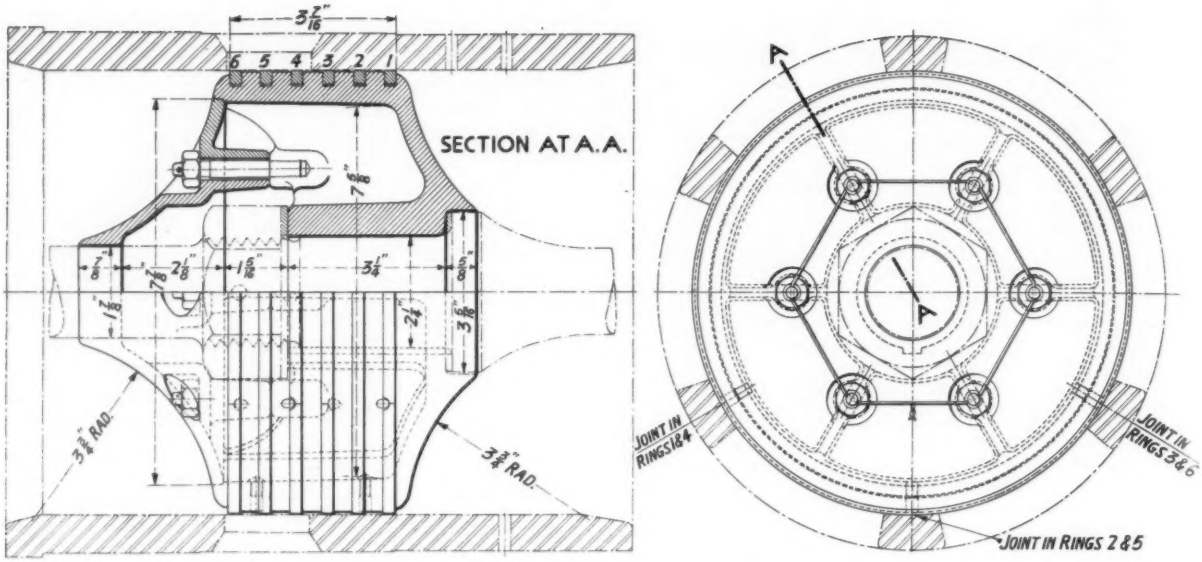


Fig. 13—Streamlined piston valve

gold country used to obtain the precious metal by the most simple and primitive methods. They used even to find gold nuggets lying ready to hand in the river beds. Now in those same goldfields it is necessary to instal the most expensive machinery and draw upon all the resources of modern science to win the gold from the mother rock. In locomotive design also it has been possible to win large savings in the past by relatively simple means, but each succeeding economy is subject to a law of diminishing returns, and there is visible all over the world a tendency to realise that in order to establish further gains more elaborate testing apparatus must be set up, and the resources of science drawn upon.

In the matters which we have been discussing, therefore, it is necessary to obtain means of measurement which must not only be exact, but must also be capable of isolating and evaluating each individual factor in a complex problem whilst the others remain constant. In the difficult problem of the locomotive as a vehicle on the rail it has been indicated how the different forces must be measured and recorded, and for this purpose electrical apparatus is required which is neither simple nor cheap, but without such apparatus it is hardly possible to advance our knowledge and ensure that we have obtained the best relationship possible.

Similarly in the realm of efficiency, the test plant becomes a necessity as by no other means can the large number of variables inherent in locomotive running be kept constant, while only one is varied at will. When one thinks of the questions yet unanswered regarding combustion, front end design, and steam flow, to mention only three, it can be realised that the day when rough and ready indications obtained by sending a man out on the footplate armed with a pyrometer and a U tube will no longer suffice. Accordingly, as is well known to members of this institution, a stationary testing plant is at present under construction under the joint management of the L.M.S. and L.N.E. Railways. Such a plant is unnecessary if we are prepared to rest on our laurels and hope for the best. Engineering instinct and commercial common sense alike revolt at such an attitude, and we must pay tribute to the foresight and perseverance of Sir Nigel Gresley in initiating an enterprise which will permit us to perfect still further that most youthful of veterans—the steam locomotive.

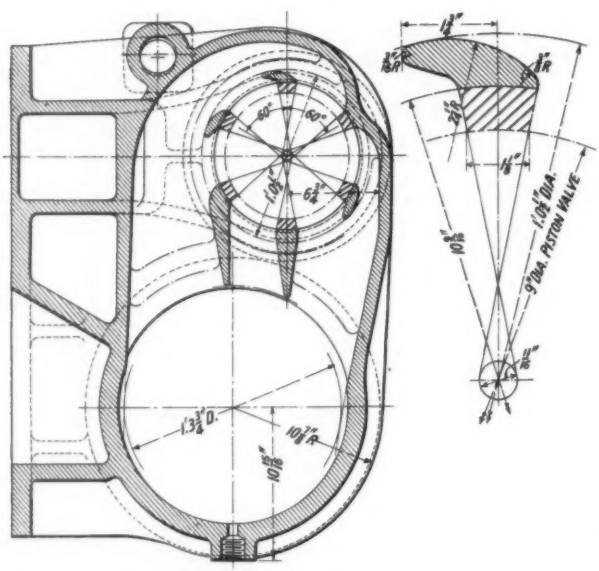


Fig. 14—Streamlined steam ports

NEW VESSELS FOR HARWICH—FLUSHING SERVICE.—The second of two new vessels for the Harwich—Flushing service, was launched by Prince Bernhard on March 25, at Flushing. The first of the new vessels was launched in January by Queen Wilhemina. These vessels will perform the daily service between Harwich and Flushing in connection with the L.N.E.R. boat trains to and from Liverpool Street. The new ships will be approximately 4,100 tons gross with a speed of 23 knots. They will be propelled by two-cycle Sulzer diesel motors of 12,650 h.p. and will have a carrying capacity of 1,800 passengers. There will be spacious restaurants with seating accommodation for 240 passengers. Sun decks will be provided for both first and second class and there will be a number of private cabins.

A.T.C. ON THE GERMAN STATE RAILWAY

Further extensions of the inductive system have been made and trials with the optical system are being continued

THE general principles of the very complete intermittent inductive automatic train control system adopted by the German State Railway have already been described in THE RAILWAY GAZETTE for September 7, 1934, and May 1, 1936. Although a great amount of work has since been done in improving the constructional details, the essential principles of operation have not been affected. The three-frequency system is the one most generally used, but a five-frequency form has been designed in order to meet a rather larger programme of requirements than was originally laid down.

Herr Reichsbahnrat Krauskopf, who has been closely associated with the work for some years past, has recently published a detailed account of it, with numerous illustrations, in *Der Bahn-Ingenieur*, from which the following figures and other details are taken. A map is included, showing the sections of line fitted with the inductive A.T.C. in May of the present year (1938), and it will be seen that almost all the principal main lines in Germany, as it was prior to the Austrian *Anschluss* (including all over which high-speed services are worked), are equipped, while the extension of the system to the new portion of the Reich is in hand.

The principal advantages of the Reichsbahn inductive system, which induced the management to adopt it so extensively, are the absence of any source of electrical

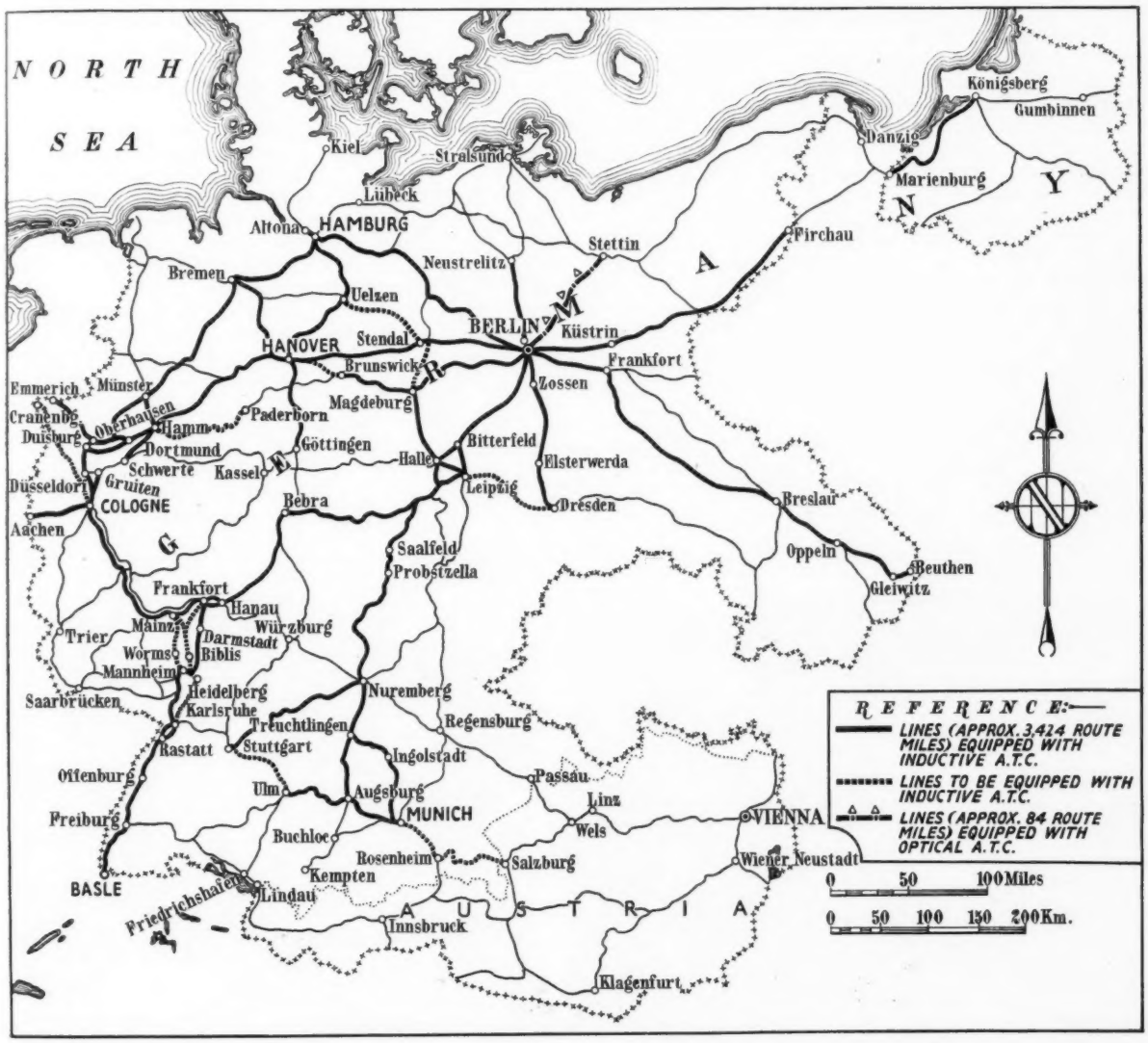


Diagram showing position on January 25, 1939, of A.T.C. equipment on the German State Railway. It includes some 12,000 track magnets and also a main-line section fitted with the optical system and the necessary signal mirrors

energy on the track, the simplicity of the equipment on the signals, which is limited to ordinary circuit-closers, and the immunity to the effects of the weather, due to absence of physical contact between the train and the track apparatus. In addition, the equipment can be applied both to distant and stop signals and exercise a speed control over the train after passing a caution indication, so preventing careless driving after a warning has been seen. Temporary speed reductions can also be covered, and a warning given to a train if level crossing barriers have not been closed. It is, moreover, easy for the staff on a train which has to stop in consequence of a mishap, to put down a temporary absolute stop track magnet as a protection, when the rules require it. Maintenance of the lineside equipment is simple and inexpensive. The apparatus on the train is, however, somewhat complicated but has worked very satisfactorily.

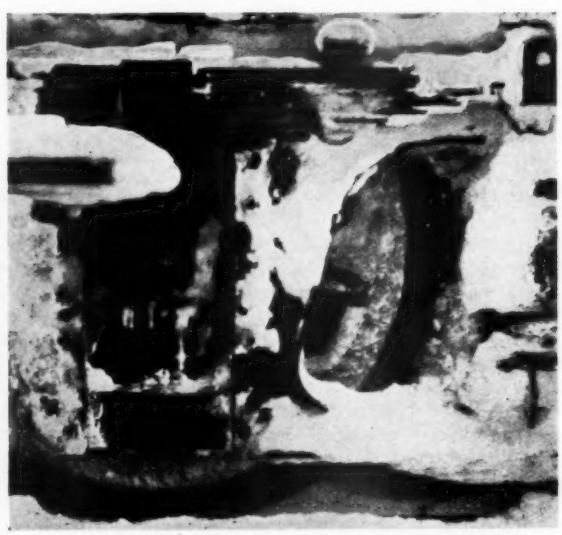
By the end of 1933 about 1,290 km. (801·5 miles) of double track had been fitted with A.T.C., but the work of equipping the principal main routes on the three-frequency system, by then developed to a satisfactory degree, began in the next year with the introduction of the high-speed railcar services; the routes selected were: Berlin—Hanover—Essen—Cologne; Cologne—Duisburg—Oberhausen — Wanne — Münster — Osnabrück — Bremen — Hamburg; Berlin—Bitterfeld—Leipzig; Leipzig—Weissenfels—Fulda—Frankfort (Main); Saaleck—Jena—Saalfeld—Bamberg—Nuremberg; Berlin—Frankfort (Oder)—Breslau—Beuthen; Berlin—Dresden; Berlin—Firchau and Marienburg—Königsberg. Parts of these routes, however, and the Berlin—Hamburg line had already been equipped. The total double-track mileage was 3,233 km. (2,009 miles) and about 6,000 track magnets were required. The latter were ordered from the V.E.S. and Lorenz works. Further sections from Nuremberg to Stuttgart, and to Munich *via* Ingolstadt, totalling 389 km. (242 miles) with 622 track magnets were later taken in hand. During 1935 the express railcar services, fitted with A.T.C., were introduced on the Berlin—Cologne and Berlin—Frankfort (Main) routes, the other routes being thus served in 1936, with the introduction of the summer timetable. The Berlin—Brunswick—Magdeburg route, previously fitted with simpler equipment, was changed to the three-frequency system. At the end of 1936 about 4,244 km. (2,637 miles) of double line, with 8,000 track magnets, were in operation. Early in 1937 it was decided to proceed with the equipping of a further 1,200 km. (746 miles) of double track on the following routes: Hanover—Bremen; Hanover—Hamburg; Hanover—Göttingen; Cologne—Coblenz—Mainz, with conversion of old single-frequency equipment thence to Frankfort (Main), and on *via* Darmstadt, Mannheim, and Karlsruhe to Basle. (The short section of old equipment between Offenburg and Freiburg was modernised); Munich—Treuchtlingen; Augsburg—Ulm; Halle—Leipzig; Emmerich—Oberhausen.

In May, 1938, the equipment comprised 5,442 km. (3,369 miles) of double track and 11,600 track magnets. About 810 km. (503 miles) of route remained to be dealt with, on the following routes: Munich—Salzburg; Stuttgart—Ulm; Cologne—Cranenburg; Cologne—Aachen; (since completed) Leipzig—Dresden; Mainz—Worms—Ludwigshafen—Heidelberg; Frankfort (Main)—Mannheim; Friedrichsfeld—Heidelberg—Bruchsal—Karlsruhe; Friedrichsfeld—Schwetzingen. It is likely that further installations may be made when the above are complete.

At the end of 1933 there were 124 locomotives, or driving vehicles, fitted with the necessary apparatus, but of these only 30 were on the three-frequency principle, adopted for all further work. In 1934 seventeen railcar units were equipped. By May, 1936, there were 148 locomotives and 18 railcar units fitted and in that year orders were given to equip 120 locomotives, and by the beginning of 1937, 184 steam, and 3 electric locomotives, with 18 railcars, were in service so fitted. By May, 1938, there were 228 steam and 2 electric locomotives and 21 railcars fitted with the apparatus. A further 391 equipments were in hand, making a total of 642. There are 84 sets of the early single-frequency apparatus also in use.

The five-frequency design is as yet in use only to a small extent. The accompanying map shows the position on January 25, 1939, the route mileage of the inductive system then being 5,510 km. (3,424 miles), 485 locomotives and railcars being fitted. Work is at present in hand between Brunswick and Lehrte, Uelzen, Stendal, and Magdeburg, and Unna, Soest and Paderborn.

The optical A.T.C. is on trial between Berlin and Stettin, 135 km. (84 miles), 4 locomotives being equipped. The Berlin City and Suburban lines are fitted with train stops.



Snow caked on the running gear of a Norwegian State Railways train during the severe weather of last January

ROAD TRANSPORT SECTION

This section appears at four-weekly intervals

London Transport Country Services

AN important step in the development of the Country Bus and Green Line Coach services of the London Passenger Transport Board has been taken in the transfer of the central administrative staff from Reigate to the board's headquarters at 55, Broadway, Westminster. It was felt that many advantages were to be derived from having the General Manager, the Operating Superintendent, and the Indoor Superintendent, with their staffs, situated in the middle of the area for which they are responsible, instead of in a town near the southern boundary of the board's territory. The progress of the Country Buses and Green Line Coaches in the last 5½ years is one of the most interesting developments since the formation of London Transport. The passengers carried by the Country Buses numbered 39,400,000 more in 1937-38 than in 1933-34; and the increase on the Green Line Coaches was 6,100,000. The board, which was formed in 1933, took over 66 independent country bus and coach undertakings which operated between them 246 routes. After thorough investigation, co-ordinated traffic schemes were introduced in the Windsor, Slough, St. Albans, Watford, Amersham, High Wycombe, Gravesend, and Hertford districts. The rolling stock has been improved by the withdrawal of old-model vehicles and the introduction of 330 new buses and 180 new coaches. In all, the Country Bus and Coach section now operates 214 bus routes and 34 coach routes, and uses 30 garages. The section employs a staff of 4,574, excluding the engineering staff. Drivers are recruited from men who have served as conductors—a system that both provides a means of promotion, and also uses the route knowledge acquired by conductors. During the past two years 227 conductors have become drivers.

Buenos Aires City Transport

ON February 16 all city transport in Buenos Aires, including underground railways, tramways, buses, and other urban systems, was taken over by the newly-formed Transport Corporation. A Decree issued on November 3 last year by the Ministry of the Interior fixed the authorised capital of the corporation at $670,684,477 paper, distributed as shareholdings among the different concerns as follows:—

	$ Paper
National Government	38,719,594
Municipality	109,527,242
Anglo-Argentine Tramways	210,167,301
Lacroze Tramways	36,026,999
Lacroze subway	62,875,751
C.H.A.D.O.P.Y.F.	105,759,756
Southern Electric Tramways	7,740,557
B.A. Town & Dock Tramways	10,064,242
Bus companies	58,681,418
Colectivos	31,121,617

In the event of it being necessary to increase the authorised capital to meet the needs of new services or the extension of the existing ones, 7·411333 per cent. of the new shares will be allotted to the National Government, and 20·964653 per cent. to the municipality. Figures recently published show that the number of journeys *per capita* in Buenos Aires has probably doubled in the last 20 years. Various factors are responsible, among them feminine emancipation—at the end of the war period few ladies, especially young ones, ventured alone in a public vehicle. Also, since the 1930 crisis, when a two-hours-for-lunch system was instituted in the city, it has been the habit of clerks and other workers to return home for the midday meal. Nearly 30 million passengers are carried monthly in the *colectivos*, the importance of which in the city transport scheme is seen by the size of their holding in the new corporation. A *colectivo* may be described as an elongated motorcar, or, as it often is, as a "microbus." Each vehicle seats 10 to 12 passengers. Their popularity, and that of the buses, has contributed to a decline in the numbers using the underground and train services in the past ten years. Possibly something will be done to restore the popularity of tramway services by the new streamlined vehicles introduced by the transport corporation last year, and described in our January 13 issue.

Coach Speeds in the U.S.A.

THE recent grant of more than $60,000,000 by the U.S.A. Public Works Administration and the Reconstruction Finance Corporation to the Pennsylvania Turnpike Commission for the construction of a super-highway between Pittsburgh and Harrisburg, will result in a material shortening in the Chicago — New York motorcoach schedules of the Pennsylvania Greyhound Lines. The new highway will follow the right of way of the old South Penn Railroad, on which the late Mr. William H. Vanderbilt spent ten million dollars 50 years ago in a vain endeavour to build a railway into the Pittsburgh district from the east. The work involved in the proposed conversion of the old railway alignment into a modern motor road formed the subject of an illustrated article in our September 24, 1937, issue. The new road will avoid many of the steep grades and sharp curves on the present highways across the Allegheny and Blue Ridge mountains. Despite the mountain operating conditions at present, the Pennsylvania Greyhound has been markedly successful in increasing the speed of its through runs on the existing highways, since the Pennsylvania Railroad acquired a large interest in this portion of the nation-wide Greyhound bus system. Formerly all buses, including the Chicago—New York through runs, stopped nearly everywhere. Local runs still make highway stops and provide for short-distance riders, but the Pennsylvania Greyhound has also built up a system of express runs through the mountains over both the William Penn and the Lincoln highways. The former passes through Altoona, Tyrone, State College, and Lewistown *en route* from Pittsburgh and points west to New York, and the latter *via* Bedford, Gettysburg, Lancaster, and Philadelphia. The new Cruiser type coaches used on such services were illustrated on page 231 of our February 10 issue. The fastest run operated *via* the Harrisburg route is the Dearborn Limited, on which higher fares are charged. This bus makes the run between New York and Pittsburgh in 12 hr. 10 min., westbound, and its companion, the Atlantic Limited, maintains the

XUM

same schedule eastbound. The run from Harrisburg to Pittsburgh, 238 miles, across several mountain ranges, is made in 6 hr. 38 min., or at an overall speed of 36 m.p.h. In contrast with the local buses, which require 8 hr. 10 min. for the run and make between 25 and 30 stops between Harrisburg and Pittsburgh, these two limited-stop buses make only one stop in each direction, a 10-min. rest stop at Duncansville, Pennsylvania. In addition to the limiteds, six New York—Pittsburgh expresses are operated in each direction daily, which make the through runs of 418 miles in approximately 13 hr. All these runs are from 5 to 7 hr. faster than similar runs of three or four years ago. Similar conditions apply on the runs operated over the Lincoln highway between New York and Pittsburgh *via* Philadelphia and Gettysburg. The fastest of the express runs makes only two stops between Gettysburg and Pittsburgh, 175 miles, and takes 5 hr. 50 min. for the run, and several other runs equal this schedule in both directions. In this mountainous country overall bus speeds of 30 m.p.h., unknown a few years ago, are commonplace now. Apart from the elimination of intermediate stops on the fast runs, higher running speeds have been aided materially by their mechanical improvements of the new buses operated on these runs, permitting much greater speed with safety. A further factor is that the drivers are no longer required to remain at the wheel for many hours at a stretch. For example, on the runs in question, a driver now covers a 175-mile stretch such as that between Pittsburgh and Gettysburg. We are indebted for these data to our American contemporary, the *Railway Age*.

Berlin Transport

THE way in which all the various forms of local traffic in Berlin have been grouped is not without interest in view of the experience of other large capital cities. The war had the result of impoverishing the three main units of Berlin local transport, namely, the tramway system of the Grosse Berliner Strassenbahn Gesellschaft, the Berlin General Omnibus Company, and the Elevated & Underground Railway. In 1919 the Greater Berlin Tramways Company sold its undertaking to an association controlled by the city authorities of Berlin. At the same time the city acquired the controlling interest in the shares of the Berlin General Omnibus Company which was previously in the possession of the tramways Company. In 1923 an organisation called the Municipal Tramway Operating Company took over the working. Three years later (in 1926) the city of Berlin secured the majority of the shares in the Berlin Elevated & Underground Railways, and in 1927 established a working agreement between the three units—tramways, buses, and underground railways—which included the introduction of a 20-pfennig uniform fare with transfer rights. It was obvious that this was merely an intermediate step, and on November 30, 1928, an organisation was established called the Berlin Preparation Company for the Standardisation of Traffic. A few days later its title was altered to the Berliner Verkehrs Aktien Gesellschaft which on January 1, 1929, formally took over the Berlin tramways, underground, and buses. The initials of this company—B.V.G.—have since become as familiar in Berlin as our own fleet name of London Transport in London. The company's crest included these initials at the top, above a silhouette of the famous Brandenburg bear.

Dating from the beginning of last year a further change took place whereby the company has been wound up and the whole undertaking and its equipment transferred direct to the city administration as from January 1, 1938. The services are managed by a business board which is directly responsible to the City Advisory Transport Council. At the present time, the tramways (which are all on the standard 4 ft. 8½ in. gauge) total 578 km. of route (360 miles). The equipment includes 1,562 power tramcars, and 1,266 trailers. In addition there are nine trolleybuses maintaining a short route between Spandau and Staaken which was opened on December 24, 1933. Incidentally, the authorities in Germany are entirely unconvinced that there is any advantage to be gained in converting tramways to trolleybus operation. They regard trolleybuses as a special type of vehicle suited for peculiar needs and not as a general unit of urban transport. One feature of the Berlin tramway system which is not well known is the fact that a service is maintained for the transport of postal packages from the post office to the railway stations, for which special cars and trailers are detailed. In addition to the postal service a goods line serves certain factories and conveys approximately half a million tons per annum.

Rail and Road Competition in Nigeria

THE loss of potential rail traffic to road transport in Nigeria is necessarily a constant matter of concern to the management of the Nigerian Government Railway. The report of the Director of Transport for the year 1937-38 states that the point-to-point road transport rates between places on the railway as recommended by the Nigerian Motor Union (but not always adhered to) range from 1·86d. to 2·13d. per ton-mile. The corresponding rail rates—when the 3s. 6d. a ton for shore-handling at the port is deducted from the consolidated zone rate—range between 1·32d. and 1·91d. It is the direct movement between forwarding and delivery points which gives to road transport its main attractiveness. Some measure of control over the number of road vehicles operating over prescribed roads paralleling the railway in southwest Nigeria is secured by doubling the vehicle licence, which in effect, adds a trading licence to the vehicle licence. The Director of Transport states that this is the only practicable substitute for the issue of vehicle licences on the basis of actual traffic requirements, which system would require special administration. According to the report of the General Manager of the railway, covering the same period, a computation of the loss of railway revenue, based on a census for one month of parallel road traffic, gave an estimated figure of £151,359 for a year, but it is admitted that such a computation must be arbitrary. There were 5,113 lorries in Nigeria as a whole, and 2,078 in the area of greatest competition. The results of the efforts made to stop the loss of railway traffic have not been encouraging to the railway administration. The railway made rate reductions but the road rates were still further reduced. Then in 1933 a " voucher " system was put in force, under which persons sending from one ton inland at a low flat rate received a voucher entitling them to export a similar tonnage at a reduced rate. This worked well, but as imports are much less than exports there was always a balance which had to pay full rate. In 1933, on the advice of a Traders' Association the voucher system was abolished and a flat rate of 2d. a ton-mile substituted. This has not been successful, and the record of its application is one of continued and considerable monetary loss to the railway. The report quotes the relevant resolution of the South African Transport Conference of 1936, to the effect that a scheme of control of transport is necessary in the best interests of any country, and says that, in the face of increasing expenditure and rising loan charges, road transport legislation is essential if railway revenue is to be increased commensurately.

Census of Road Vehicles

The Ministry of Transport White Paper No. 121A, recently issued, contains some informative particulars of the number of mechanically-propelled vehicles licensed pursuant to the Roads Act 1920, the licences for which were current at any time during the quarter ended September, 1938. The figures show that the number of such vehicles was 3,093,884 compared with 2,938,485 during the corresponding quarter of 1937, an increase of 155,399 or 5·3 per cent., and producing easily the highest total yet recorded. The largest group of vehicles embraced in this total was that of private cars which numbered 1,944,394, an increase of 146,289 over the previous corresponding quarter and an increase of no less than 120 per cent. compared with 1928. Motor cycles at 462,375 show a decrease of 25,203 compared with September, 1937; trams a decrease of 669; while goods vehicles totalled 494,866, an increase of 15,944 or 3·3 per cent.

Private Cars

Of the private cars, the eight-horsepower class is easily the most numerous, the total being 540,728, an increase of 13 per cent. over September, 1937. Cars of the ten-horsepower type totalled 451,805 and it is of interest that the increase in this class—70,830 or 19 per cent.—was the largest of any group. The next most popular car was the twelve-horsepower vehicle, which numbered 279,084 compared with 265,814 in the previous September. Together these three groups of cars constitute 65 per cent. of all the cars taxed on horsepower.

Goods Vehicles

The detailed figures given under this head show that five-wheeled vehicles of all classes increased by 921 to 4,700 as compared with September, 1937; six-wheeled and eight-wheeled vehicles by 22 to 11,443; and vehicles licensed for drawing trailers by 13 to 6,548. As to the method of propulsion, 489,464 vehicles were fitted with internal-combustion engines, an increase of 15,169 over 1937. While those using light oil increased by 13,666 or 2·9 per cent., it is of interest that those using heavy oil increased by 1,504 or 21·1 per cent. Steam driven vehicles at 992 showed a decrease of 296, while those propelled by electricity rose by 1,071 to 4,410. The largest group of vehicles comprised those with an unladen weight ranging from 2 tons to 2½ tons, these numbering 115,347 or 23·31 per cent. of the total; those weighing from 1½ tons to 2 tons numbered 107,771 or 21·78 per cent. of the total. The position existing at the previous September has thereby been reversed, as at that date those weighing between 1½ tons and 2 tons were the most numerous, totalling 211,053 or 23·19 per cent., while those between 2 tons and 2½ tons numbered 99,080 or 20·69 per cent. of the total.

Publications Received

A History of Everyday Things in England: Vol. 3. The Rise of Industrialism, 1733-1851. By Marjorie and C. H. B. Quennell. London: B. T. Batsford Limited, 15, North Audley Street, W.1. 9 in. × 6 in. × 1¼ in. 226 pp. Fully illustrated. Price 8s. 6d. net.—Within recent months, we have noticed in these columns new editions of two parts of this excellent four-part work, and the second edition of volume 3 has now been produced. In general arrangement it continues the form adopted for the earlier periods, which in the present case has both its advantages and its drawbacks. The main advantage, of course, is that comparison of like things in earlier periods is facilitated, and the chief disadvantage is that the fundamental changes wrought by transport developments are insufficiently stressed. The basic idea of these volumes is to record everyday things, and for a considerable part of the period covered no form of transport was an everyday thing in the lives of the common people. Nevertheless, wagonways were certainly within that category in the Durham coalfield, tramroads or plateways in South Wales, and regular coach services practically throughout the country. Such matters are, of course, mentioned—and with the customary Quennell accuracy—but we feel that the authors were less at home with the transport of this period than with other aspects of common life. We should have wished to have seen some treatment of the first rail and road conflict and of the railway mania. However, discerning readers will not be insensible to the fact that the task of the historian varies at different periods. Previous to 1733, the main difficulty is to find sufficient details of everyday things (including transport), but from the middle of the eighteenth century onwards the work becomes one of rigid selection. In many respects the authors have given preference to little-known facts at the expense of well-covered subjects, and this is all to the good if the reader accepts a very fine volume with the knowledge of its limitations in such important spheres as transport.

Wagen Ohne Pferde; Roman der Verkehrsrevolution. (Horseless Vehicles; The Story of the Transport Revolution.) By Werner Siebold. Berlin: Frundsberg-Verlag G.m.b.H. 7⅜ in. × 5 in. × 1¼ in. 331 pp. Illustrated. Price RM. 4·80 net.—The author of this attractively-written volume sets out to present, in the form of a tale just sufficiently connected for his purpose, the story of the development of mechanical transport on land, especially that of the motor vehicle. Beginning with the evolution of the steam engine, stationary and locomotive, the efforts and achievements of Boulton and Watt, Trevithick, Murdock, Blackett, and the Stephensons, he combines with this a sketch of the inception of the railway system in Great Britain and on the Continent. All the time the author continues to weave a thread of human interest into the theme, touching on the disappointments, the hopes, even the love affairs of those to whom the great transport revolution of the 19th century is due. The work of List, Harkort, Baader, Denis, and others in Germany is well delineated and we learn that a fireman on the first railway in Baden was the father of Benz, the automobile engineer. The first portion of the book ends with the triumph of steam and the establishment of the railway, due attention being given, however, to the efforts to make steam road vehicles a success, associated with Hancock, Gurney, and others.

The second part of the volume tells of the evolution of motor road vehicles and the lives of Benz, Daimler, Maybach, Lenoir, Otto, Langen, Panhard, Levassor, Bosch, Dunlop, and others whose labours resulted in the motor vehicle of today. It is strange to read that Benz and Daimler never met to speak to one another. The various parts of the narrative are well proportioned and the style simple and bright, holding the reader's attention and presenting just enough facts to enable the course of events to be grasped by anyone quite unacquainted with the theme, while the various individuals are made to appear clearly with their weaknesses, capabilities, and other attributes. There are interesting details of the various early motor racing events, and of Wölffert's first airship flight. The narrative is brought down to the present time, glancing at tanks and other motor vehicles of the great war and ending with the "people's car," of which great things are hoped in Germany. The book should gain a place among the most readable of the popular works on transport, which always seem acceptable to the public in all countries.

"English Electric" Bus Bodies.—From the English Electric Co. Ltd. of Queen's House, Kingsway, W.C.2, we have received two new brochures. One is devoted to the firm's bus bodies of composite construction, the other to those of all-metal construction. In the present-day composite body the main structural members are of timber, reinforced where necessary by steel to give strength with flexibility: in the metal body, by contrast, the members are of metal. It is emphasised that "English Electric" bodywork can be adapted to suit any type of chassis without departing from the fundamental structural features. Both brochures describe and illustrate the components of the respective types of body, and also include illustrations of omnibuses and trolleybuses with "English Electric" bodies. Operators of transport vehicles are cordially invited to visit the firm's rolling stock works at Preston—the home of English Electric bodies, and the electrical equipment works at Bradford.

XUM

Traffic Lights at Road and Rail Crossings

A description of the equipment used at road crossings on the Manx Electric Railway

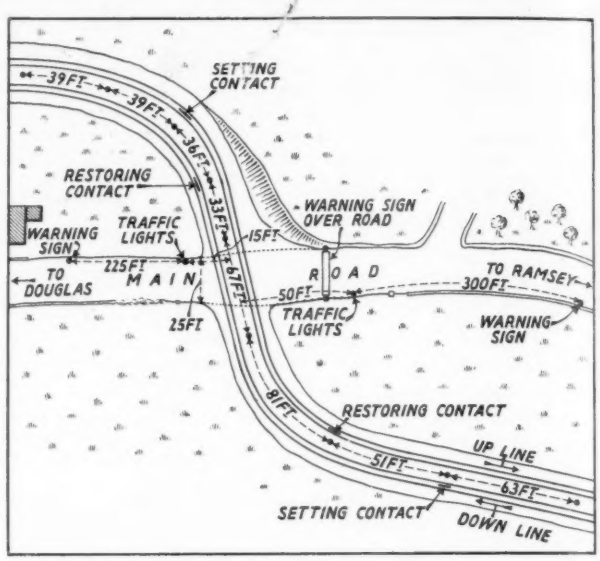
PARTICULARS of the road traffic signals used at a crossing between a main road and the Weston, Clevedon & Portishead Light Railway were published in the *Road Transport Section* of THE RAILWAY GAZETTE for August 26, 1938 (page 373). By the courtesy of Mr. E. Barnes, General Manager and Engineer, Manx Electric Railway Co. Ltd., we are now enabled to give details concerning the road signalling equipment installed at certain road crossings on the line between Douglas and Ramsey, where it follows the sea coast and crosses the main highway at five points. The railway is double, 3-ft. gauge, and operated on the overhead trolley system with centre pole construction.

By acts of Tynwald—the island government—of the years 1892, 1893, and 1898, the Howstrake Estate Company, the Douglas & Laxey Electric Tramway, and the Isle of Man Tramway & Electric Power Company, which constructed various parts of the line, obtained powers to cross the main road at various points on the level, and a speed limit of 6 m.p.h. was imposed. During the summer, flagmen were posted at four of the crossings to warn electric car drivers of approaching vehicles—until the war chiefly horse-drawn charabancs. An attempt in 1908 to provide an automatic warning signal worked by rail contact was unsuccessful, but resulted in the company erecting fixed warning signs suspended 20 ft. above the roadway, and lighted at night by fifteen 32-c.p. lamps. No flagmen were employed after the war.

Motor traffic increased to such an extent that in 1933 the government asked the company to erect automatic traffic signals similar to one installed experimentally at a street crossing in Douglas. The company successfully pleaded equal rights with the road authority, and arrangements were made to erect a set of signals at one crossing, for trial, at Government expense. The experiment was successful, and the matter was passed to the road authority to deal with. In 1935 this authority ordered two more crossings to be similarly fitted up, and agreed at the same time to pay an annual sum to cover cost of maintenance and power. The working of the apparatus is illustrated on the accompanying diagram, which show a typical crossing—Ballabeg—and scheme of circuits.

The Signal Equipment

The traffic lights have only two aspects, red and green; green is the normal indication. An installation comprises a traffic signal on each side of the crossing, and a caution or approach warning sign at some distance in the rear. The original warning signs over the road are in use as well in some cases. The changes in the colours of the lights are produced by the car trolleys actuating contact makers and breakers (giving the effect of treadles) on the overhead wires. At about 50 yd. from a crossing an approaching electric car passes a " setting " contact, consisting of steel strips, 3 ft. long, suspended from a wooden support by flat steel springs, in such a position that the trolley bridges the strips and the wire, and transmits current to a relay with two armatures. One of these establishes a stick circuit from the following " restoring " trolley contact, which is a hinged switch, normally closed, so that the relay remains energised after the " setting " contact has been passed. When attracted, the second armature on the signal relay opens the green light circuit



Typical layout of crossing signals and signs, Ballabeg, Isle of Man

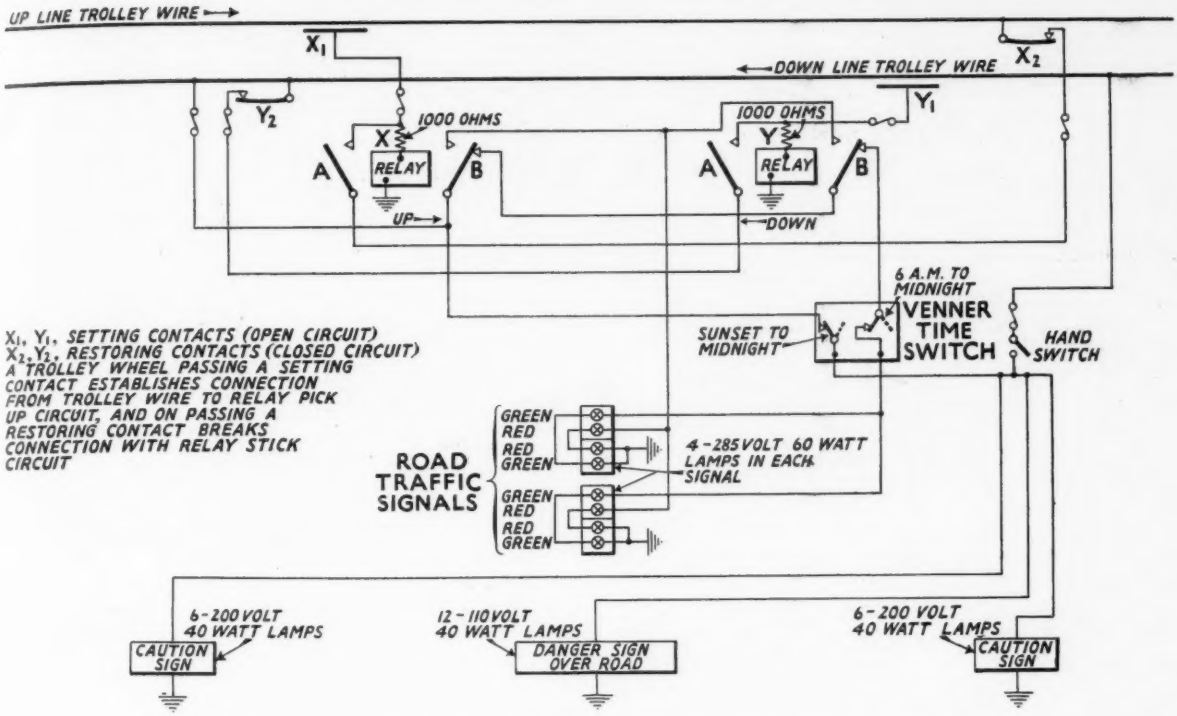
and puts a direct feed on the red. When the car trolley passes the " restoring " contact beyond the crossing, it opens the stick circuit and de-energises the signal relay; this causes all parts to return to the normal condition. There is, of course, a signal relay for each direction of railway traffic; the green traffic lights require both to be de-energised. The red is switched on if either is picked up. If a second car approaches after another one has put the traffic signals to red, they will remain so until both cars have operated their " restoring " contacts clear of the crossing. The trolley contacts will work up to speeds of 30 m.p.h.

The apparatus is designed for a working pressure of 550 V, and was, with the exception of the time switches, manufactured by the Forest City Electric Company of Manchester. The time switches are of the Venner type, with hand-wound 28-day clocks, solar dials to switch the warning signs on at sunset, and hand adjustable contacts to switch the traffic lights on at 6.0 a.m.—all lights are extinguished at midnight. Mercury switches are used in the lighting circuits. The signal relays, with appropriate fuses and disconnection switches, are housed in a case on one of the traffic light standards.

Experience Obtained

As road vehicle drivers complained of glare from them at night, the traffic lights were accordingly turned some 20 to 30 deg. from the line of roadway. Not knowing that the company had equal right of way over the crossings, and thinking it had itself put the signals up, many drivers proceeded to ignore the red lights until a prosecution was initiated following a collision between two road vehicles which had been driven against the signals. This proved effective.

A more serious difficulty arose from the inability of road drivers to appreciate that two electric cars might be



Electrical connections for level crossing signalling apparatus, Manx Electric Railway

approaching the crossing. They would drive on directly one passed, despite the fact that the lights were still red, only to be taken unawares by the second electric car almost on top of them. Many road users complained of the quick change from green to red, and an amber light, preceding the red, would be an improvement and contribute to safety, as would a stop sign on the road.

Failures to set the red lights were unfortunately fairly common at first, due to faulty contact between trolley wheel and " setting " contact strip. The spring tension had to be carefully adjusted, and a perfect run through for the trolley wheel was essential. With heavy tension on the side strips, leading to the wheel momentarily leaving the wire, the electric car, taking power over the stick circuit, would blow the fuse therein. Switching the controllers off when passing the " setting " contacts made an appreciable difference in the number of failures, and during the last two years they have been comparatively few.

Manx Highway Administration

Government in the Isle of Man is effected by board. The Highway Board consists of seven members of the Legislature, elected by that body from among its own members, and it exercises administrative powers over all roads with the exception of those in the town districts of Douglas, Ramsey, Peel, Castletown, Port Erin, and Port St. Mary. It derives its income from various licence fees and local rates, and receives a grant of from 50 to 75 per cent. from the Government towards road maintenance, according to classification. Each roadway has been classified. This grant is also made available to the town districts which control their own roads, and is used in payment for road work by unemployed men, for whom no insurance scheme exists. Since 1920 all men out of work on October 1 in any year register as unemployed. As many as possible are thereafter engaged for road repair work during winter months.

The question as to whether traffic signals are part of road reconstruction and maintenance has been decided by the 100 per cent. grant to the board for the lights at the electric railway crossings, and one on the same scale to Douglas Corporation for traffic lights on Class 1 main roads in the town. The revenue of the board for the year ending March 31, 1938, was £100,089 and the expenditure £104,302. Among the items in the income were: Government grants £53,150; dog and vehicle licences £23,300; driving licences, guns, game, &c., £5,713; liquor licences £4,975; highway rate £5,598. A sum of £71,000 from petrol tax went to the island exchequer funds. There is no Traffic Act. All classes of transport are in direct competition; fares and rates are adjusted by companies and owners to suit. Only passenger-carrying road vehicles are subject to inspection before a licence is granted each year, on April 1 in all cases.

Except when an accident occurs, railways open all the year round are not subject to inspection, but those such as the Snaefell Mountain line, and Port Soderick Tramways, which operate only in the summer months, have to be inspected by a Government engineering representative before traffic may begin.

UNUSUAL TYPE OF RADIATOR SHUTTER FOR S.M.T. BUSES.—A simple but ingenious type of radiator shutter in polished sheet aluminium is fitted to the latest oil-engined double-deck buses now being supplied to the Scottish Motor Traction Co. Ltd. by Leyland Motors Limited. The shutter, which completely covers the radiator tubes, is built in two separate pieces either of which can be detached without disturbing the other. The bottom plate is a plain aluminium sheet excluding all draughts to the bottom half of the radiator; the top plate has 14 slots which can be closed by a sliding plate.

XUM

Warning Signals at Level Crossings

During the past few years various new methods of signalling have been introduced in order to diminish risk at open level crossings

LEVEL crossings have been in existence since the earliest days of railways and were a source of danger and anxiety before motor vehicles appeared; with the increase in the number of the latter, especially since the war, the problem has become continually more acute and has given rise to a great variety of proposals for securing greater safety at such places. Many level crossings have of course been replaced by bridges, the only completely satisfactory solution, but financial difficulties prevent this in large numbers of cases. Conditions vary considerably in different countries, and from one locality to another in the same country.

The use of gates, interlocked with fixed signals, as adopted in England, or barriers of the lifting type, as on the Continent, is often impracticable, as is also the stationing of watchmen to give danger signals to road traffic. Reliance has then to be placed on automatic warning signs or signals, set in action by the approach of a train, if we are not to be content with plain warning boards.

Such devices—of which there is a great variety of designs—were first used to any extent in the United States, where large numbers of crossings exist, but they have since found application elsewhere. They are generally actuated by track circuit, but occasionally treadle rail-contacts are used or, on electric lines using overhead conductors, so-called trolley contacts, in effect " treadles " worked by the overhead gear of the cars. An example of this is to be seen on the Douglas and Laxey line in the Isle of Man. Although " wig-wag," or moving sign devices such as that illustrated in our issue of May 6, 1938, page 894, have been applied and have special advantages in certain places, the general tendency now is to use lights as warnings to the public at open crossings, with either the regulation street traffic type of signal, or a special form. The former has been used in Great Britain in conjunction with gates, as at Hull, and in our issue of August 26, 1938, at page 373, we illustrated their use at an open crossing on the Weston, Clevedon & Portishead Light Railway. In this case signals are provided on the railway also—without, however, the yellow (amber) light, which is not required—so protecting both types of traffic in a reciprocal manner. The green light on the railway gives the engine driver a positive assurance that red lights are being exhibited to road vehicles. Similarly many other types of crossing warning have some means, such as a side light, for advising an approaching engineman that the warning is being correctly given to road users, failing which he is required to slow down and proceed cautiously.

As an example of recent work in this field we may mention the warning signs used on the Netherlands Railways at Steenwijk, Bremmen, Velp, and Houthem-St. Gerlach, and authorised to be installed at some 20 more places, illustrated on page 589 in this issue. These use lights at all times, a white light, flashing 45 times a minute appearing normally, and being replaced by a red one, flashing twice as fast, when a train actuates a track circuit of appropriate length—about 700 yd.—to give adequate warning with the fastest train, through a mercurial make-and-break device. The rate of flashing thus signals the condition of the line, independently of the colour of the lights. This arrangement is also in use in Germany and other countries. The Netherlands authorities have, however, added an " out of order " sign, which is of much interest. Without this it is necessary to make the red light appear when anything goes wrong, to be on the safe side, but this has the disadvantage that any " danger " signal persisting when no train is really approaching readily tends to make road drivers inclined to ignore the warning at other times. Accordingly these Dutch signals have been arranged to show a fixed yellow light when anything goes wrong, a time element relay preventing this appearing if a train approaches slowly.

These appliances are, unfortunately, of no use to stop the reckless road driver, who will endeavour to cross right in the path of a train. Observation, specially kept at certain crossings in the Netherlands, revealed many cases of the warning being deliberately ignored, and the same experience has been met with elsewhere. Another difficulty arises on double lines from the fact that a second train, in the opposite direction, may approach after the first has set the warning in action. As soon as the latter has passed, the waiting road driver, assuming the signal has failed to return to normal, or perhaps ceasing to look at it at all, starts forward and is caught by the other train. To meet this some American warning signals bear an additional sign saying " Two trains," or some such words as " Don't start yet " may be illuminated. Still further protection against carelessness may be given by obstacle barriers, which rise from the road after a preliminary warning has been given and positively prevent a motor vehicle from proceeding over the line, but such devices are, of course, relatively expensive. They are, however, in regular use at some places in America.

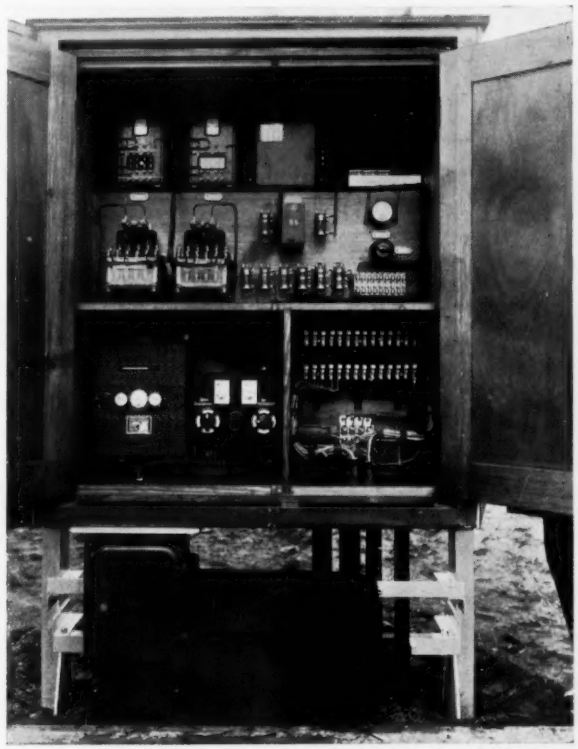
Another problem, which is perhaps more likely to arise at certain occupation type crossings occurs when a motor vehicle finds the line clear but breaks down on the crossing, creating a considerable danger to the trains, especially if it is a heavily laden lorry. To meet this emergency means of giving an alarm and setting rail signals at danger have been suggested, similar to a fire alarm push or handle, or an escalator emergency stop device, but there is then the risk of false operation by mischievous persons to be reckoned with. An alternative suggestion is to try to make the crossing into a large " road pad "—a sort of road track circuit—and let this control railway movements. Further difficulties arise where, unless special precautions are taken, shunting of trains may lead to road traffic being stopped unnecessarily, as explained in our issue of February 10, 1939, page 222, all of which considerations show that the problem of giving satisfactory level crossing warnings, and of securing obedience to them, is much more involved than appears at first sight. It is therefore not surprising that numerous types of equipment are in use and that opinions on their merits show considerable divergence.

P.S.V. LICENCE FEES.—The Minister of Transport has made the Public Service Vehicles (Licences and Certificates) (Amendment) Provisional Regulations, 1939, which provide that the fee payable for a public service vehicle licence, expressed to have effect from a date after March 31, 1939, shall be £2 instead of £3 a vehicle.

Road Traffic Colour-Light Signals

Six-foot lens hoods on the street traffic signals at Ashton bridge, Bristol. Their primary object is to prevent rail traffic on the G.W.R. line that passes beneath the bridge from mistaking the lights as rail signals

Level crossing at Worle, on the Weston, Clevedon & Portishead Light Railway, at which both rail and road traffic are controlled by colour lights. The rail aspects are red and green only. We commented on this installation in our issue of August 26 last, at page 373



Automatic flashing level-crossing warning signal as used at Steenwijk, Brummen, and other places on the Netherlands Railways. The left-hand view shows the signal and warning notices as seen from the highway; and the right-hand view the apparatus case, showing relays, fuses, terminals, and switch panel. (See article opposite)

Traffic Conditions in Canada

Systems of road and building numbering that help the motorist visiting a town with which he is unfamiliar

ALTHOUGH from time to time studies are made of traffic conditions in various foreign countries to ascertain what methods can be adopted to ease British conditions, as far as we know comparatively little attention has been paid to practice in Canada, where traffic is regulated in a speedy and efficient way. Before considering the various methods and laws used to ensure an easy flow of traffic at all hours in the large cities of Canada, it should be realised that the Canadians have one main advantage over older countries in that their towns are all built on the square system. Every town has one main street running north and south; all intersecting streets, which continue with the same name throughout their length, are numbered and referred to as east and west of this street. Another street bisects this street, and all its intersecting streets running parallel with the north-south artery are referred to as north or south. Each side of the square of houses formed by these streets, *i.e.*, between each four intersections, is called a block and each block carries one hundred house numbers irrespective of whether it contains a hundred houses or fewer. Thus a visiting motorist wanting " 604, Main Street West " knows that it is six blocks (or streets) to the west of the north-south street.

Left : Method of road numbering in towns, showing also " King's Highway " sign. Centre : Policeman directing traffic with whistle and hand signals. Right : Three-colour traffic lights for traffic and pedestrians

To ensure a smooth flow of traffic through a town certain streets are marked as " through " streets; all intersecting streets have " Stop " signs at the corners where they join a through street. All cars must stop, not merely slow, at these signs before joining or crossing the through traffic. This rule is rigidly enforced. In general the Continental rule of giving way to traffic approaching from the right applies. As a further aid to visiting motorists, the number of the block is marked on lamp-posts or telegraph poles at the kerbside. This enables the motorist to see, roughly, how near he is to the number he requires, without pulling in to the side, stopping or leaning across his seat, taking his eyes off the road, and generally becoming a menace to other motorists. These are but small points. The most complicated rule, from the point of view of the visiting driver, is that relating to trams, or street cars, as they are called, to which two main laws refer:—

1.—A street car may not, in any circumstances, except in a one-way street, be passed on the off-side.

2.—Cars may not pass a street car when it has stopped at a recognised stopping place (marked by a white pole), and passengers are alighting or entering. Cars travelling alongside street cars on the near side and unable to pass, must stop every time the street car does and allow passengers to have free access.

To break these laws is one of the most serious of traffic offences. At certain busy crossings safety zones are provided, rather like our refuges, where passengers may wait for street cars alongside the lines in the middle of the road. These laws make it very much easier for both motorist and pedestrian, as each knows just what he is allowed to do, and so give more assurance.

With regard to traffic lights, of which there is a very considerable number, a method is used which could be adopted with great benefit in England. The amber light shows only on the change from green to red, when it appears with the green. The red to green change is made direct; this eliminates the habit that so many drivers have of starting off on the amber, and often causing a collision with someone on the cross street who is trying to " beat the amber." Pedestrians are not left in doubt as to procedure on crossings; there is a definite notice

"Stop" warning for traffic joining or crossing a major road

Small pylons separating road traffic from tramway tracks

reading "Pedestrians cross on the green light" (that is, the one facing them). This does not, of course, eliminate danger from cars turning the corners, but at least gives them the knowledge that, if they can, that is the time to cross. At many crossings, especially in Montreal and Quebec, police are on point duty, and their many rapid signals and whistle-blowings are very confusing to the visiting driver. The main difference is that once a policeman has held up his hand to stop a car he does not keep it there until he releases the car, as in England, but turns immediately to direct the traffic on the intersecting streets. He blows his whistle (of the high-pitched vibrating-pea variety) when he releases the held-up traffic. Also, if one is not quick off the mark when the traffic is released, he either keeps on blowing his whistle or violently flays the air with his hands and shouts, which is very disconcerting. In Toronto which is much more English than Montreal, the police wear helmets of the London variety, and red stripes down their trouser seams. They carry revolvers, which seems strange to the visiting Englishman, and their use of the British regulation whistle for traffic control makes one think a burglary has been committed every time the traffic changes.

In all the big towns the through motorist is not left to grope his way vaguely once he reaches the outskirts, but is guided by frequent signs all the way through the town, usually by a route number marked on lamp-posts and so on. Incidentally all roads in Canada are numbered and is called a "King's Highway." In the open country the main roads are splendidly signposted, and all unusual conditions clearly marked before the part to which they refer. The roads are invariably divided by a broken white line, which becomes a solid white line at such places as curves and hills, and it is a serious offence to cross the solid line. As most corners are well banked, there is no necessity, even at high speed, to stray from the right side of the road.

One sign in particular is very effective, "Pavement (road surface is called pavement) slippery after rain." This sign, placed at all points where there is a skiddy stretch of road, seems to hit one in the eye, and makes one pay very particular attention to speed. A plain statement of fact, rather than a sign such as "you have been warned," seems to register more positively on the driver's mind. As regards speed, except for one or two minor places, the general rule is 30 m.p.h. in towns and 50 m.p.h. on the open road. Although motorists are seldom prosecuted for going a few m.p.h. over these limits, speeds such as 40 m.p.h. in towns or of 60 to 65 on the open road may lead to a prosecution not for speeding, but for the more serious charge of reckless driving. On driving while drunk the law is especially severe; in the province of Ontario all convictions for that offence lead to 7 days in prison without the option, and the automatic impounding of the car, not merely the suspension of the licence, for three months.

In spite of all these precautions, however, there is still a large road toll, which, in Toronto, up to August 19, 1938, amounted to 65 killed and 3,028 injured; 186 drivers were imprisoned and 45 cars impounded in 1938. By way of comparison Toronto has a population of approximately 616,000, although the car per head of population ratio is considerably above that of England. Generally speaking the driver visiting Canada, will find clearly marked, well-banked, roads and well-controlled, even-flowing traffic in the towns.

A striking anti-skid notice—"pavement" signifies road surface

"Turn but don't tarry" is the gist of this notice informing motorists of a useful facility

Rectifiers for Trolleybus Substations

Installations of pumpless air-cooled arc rectifiers for current supply to London Transport trolleybus routes

ONE of the most important sections of the work involved in the changeover now proceeding of London Transport tramways to trolleybus routes, is the provision of new substations to supply direct current to the overhead trolley wires. New substations are necessary for two reasons, first in order to deal with the heavier load due to the more rapid acceleration of trolleybuses and the greater frequency of service, and secondly, to reduce the average distance between the points of supply (which was often three miles or more with trams) and thus maintain a more constant voltage. In some cases the opportunity is being taken to replace an old substation belonging to a local undertaking and situated in the tramway depot, by a new one at a more suitable point, thus enlarging the depot accommodation. Contracts for the complete electrical equipment of twelve substations were placed with the General Electric Co. Ltd., and most of these are now in service. The converting units are steel-clad mercury arc rectifiers of the pumpless air-cooled type developed and introduced by the G.E.C., and their total capacity is 11,000 kW. The substations concerned supply extensive sections of the trolleybus system and are listed in the table below:—

General view of G.E.C. equipment at Blackhorse substation showing a.c. metal-clad switchboard, two twin-cylinder pumpless air-cooled mercury arc rectifier units, 375 kW. each, and d.c. switchboard

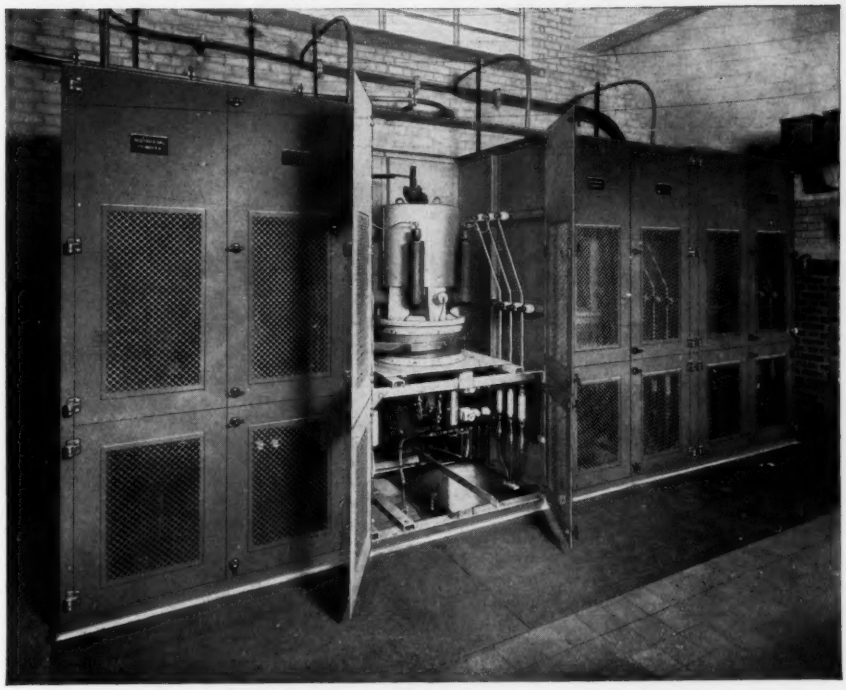
Route	Name of substation	Rectifiers	
		No. of cylinders	Total capacity
			kW.
NORTHERN AREA			
Manor House to Woodford	Woodberry ..	2 twin	750
	Blackhorse ..	2 twin	750
	Forest Road ..	2 single	500
	Chapel End ..	2 twin	750
Enfield to Tottenham Court Road	Winchmore Hill ..	2 twin	1,500
Winchmore Hill to Moorgate	Hoxton	2 twin	1,500
Liverpool Street to Waltham Cross	Stamford Hill ..	2 twin	1,500
	Edmonton ..	2 single	750
Hampstead and Parliament Hill Fields	Gospel Oak ..	2 single	750
WESTERN AREA			
Scrubbs Lane to Croydon	Garratt Lane ..	2 single	500
	Hammersmith ..	2 twin	1,000
	Putney Bridge ..	3 twin	750

The substations are supplied with three-phase alternating current, 33⅓ or 50 cycles, at a voltage of 6,600 or 11,000, and they supply direct current at 600 volts to the track. The complete equipments include rectifiers, transformers, a.c. and d.c. switchgear, chokes, and auxiliary apparatus. Either single or twin cylinder rectifiers are used according to the capacity required. A standard type of equipment has been adopted throughout, except at Putney Bridge—the first of these substations to be put into service—where special features were incorporated to meet the site conditions; this was the first substation in the world to be equipped with pumpless steel-clad rectifiers.

Pumpless Air-Cooled Rectifiers

The G.E.C. pumpless air-cooled rectifier eliminates water pumping and vacuum pumping equipment, thus economising in space and maintenance; moreover the rectifier unit with control gear is accommodated in a relatively small cubicle, giving a very compact arrangement. In addition the rectifier is highly efficient; it can carry heavy overloads and withstand heavy short circuits without damage, and is remarkably free from backfires even under abnormal service conditions. Fragile material such as glass is not used in the construction. The rectifier is of the side arm type, consisting of a cylindrical main tank enclosed in cooling air ducting, and supported by an insulating cylinder on the baseplate. A mercury pool at the bottom of the tank forms the d.c. positive pole. The main anodes are fitted in side arms, which are welded to the main tank and act as an anode shield to prevent backfires and as a radiating surface to dissipate heat (enabling anode radiators to be dispensed with).

The main anodes, auxiliary anodes, and the cathode and lead-in insulators, are equipped with the patented G.E.C. vitric seal, which has proved entirely successful in large numbers of water-cooled steel tank rectifiers. This seal consists of a number of thin mild steel cones separately coated with a special vitreous enamel; after assembly the whole seal is fused up solid in an oven, giving a strongly constructed unit having a very high dielectric strength and vacuum tightness. In the standard arrangement the rectifier cubicle contains also the cooling fan, fuse panels, surge arrestors, and isolating transformer mounted below the rectifier cylinder.



Two twin-cylinder G.E.C. pumpless air-cooled mercury arc rectifier units, 500 kW. each, at the Hammersmith substation of the London Passenger Transport Board

A.C. Switchgear and Transformers

The H.T. switchgear in most of the substations consists of a standard 11-kV. metal-clad switchboard, with an oil-immersed wing isolator for the incoming cables at each end of the switchboard. The required number of rectifier oil switches is fitted between these two incoming cable units, if possible grouped equally on either side of a bus section switch, which is mounted in the centre of the switchboard. The oil circuit breakers for feeding the rectifiers have a breaking capacity of 150,000 kVA. The transformers are generally of the standard oil-immersed type, using a six-phase delta double-star connection. Many special features of design are, however, introduced in order that the transformer will withstand the heavy rectifier loads. A small smoothing choke is connected in the negative d.c. lead.

D.C. Switchgear

The d.c. supply is controlled on a flat-back switchboard, at one end of which are mounted the rectifier panels and at the other end from three to six track feeders according to local requirements. Between these two sets of panels a metering and testing panel is mounted. All the d.c. circuits are fitted with panel-mounted high-speed circuit breakers on the positive pole and contactors on the negative pole.

The rectifier units are started up simply by closing the oil circuit breaker, which initiates the automatic starting sequence, and the units parallel on to the d.c. busbars. The feeder circuit breakers are under remote control from pillars installed alongside the trolleybus route, so that the breakers may be locked out if necessary. Normally the remote control switches are kept in the closed position, and the high-speed circuit breakers operate under the control of auto-reclose relays. These relays are arranged to reclose the feeders a number of times after a fault at pre-determined time intervals, finally locking out the feeder if the fault does not clear itself. The lockout can be reset from the remote control points.

Another interesting feature of the protective system is the installation of summation inverse time limit overload relays. These are arranged to trip all d.c. feeders upon the occurrence of a total load in excess of the rectifier capacity. This feature protects the rectifiers from excessive loading, while allowing individual feeders to take very heavy loads for short periods. After a shut-down of this type, the feeders reclose under the influence of the reclose relays; the time delay on the various reclose relays is varied so that all feeders do not reclose at once.

In view of the successful operation of the substation equipment just described, the London Passenger Transport Board has decided to employ G.E.C. pumpless air-cooled mercury arc rectifiers for twelve substations on railway extensions in North-East London. Acknowledgment is due to the board for permission to publish the information contained in this description and the accompanying illustrations.

LONDON COASTAL COACHES.—London Coastal Coaches Limited celebrated the seventh anniversary of opening the Victoria Coach Station with a " birthday party " at the station on March 30. This annual event is made the occasion of exhibitions surveying progress in various departments of road transport operation, and this year the theme was publicity. Guests received an illustrated souvenir of the event in which was presented pictorially, with explanatory text, a review of the practice of the group in the issue of press advertisements, posters, timetables, and window displays for booking agents. The organisation claims to be the only group of coach operators in this country to have taken full-page spaces in the London newspapers. The past year was noteworthy in that during the bad weather at the Christmas season, information regarding road service schedules was broadcast in the B.B.C. news bulletins. The company's first timetable, published in 1926, comprised twenty pages measuring 4¾ in. × 3½ in. At the present time the timetable has over 230 pages, each measuring 8½ in. × 5½ in. and containing about 30 times the amount of type matter compared with the first edition.

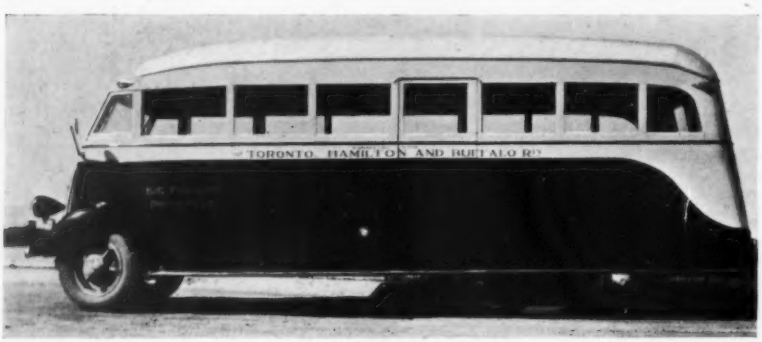
Overseas Notes

Reichsbahn Takes Over Light Railway Goods Service

On February 16 the German State Railway took over the goods service formerly maintained by the Jüterbog-Luckenwald District Light Railway and introduced a motor lorry service in its place.

A Canadian Railway Bus Service

The only bus service maintained by the Toronto, Hamilton & Buffalo Railway Company operates between Smithville (on the main line) and Dunnville, Ontario. One bus maintains a service of three round trips every weekday and one round trip on Sundays. The bus used is a Studebaker with passenger and baggage-express compartments; it has a seating capacity of 12 double seats on each side of centre aisle, facing forward, and has front entrance and exit. Originally this route was served by a steam passenger-train service, which began in December, 1914, over a railway branch 14·85 miles long.



Bus operated by a contractor (B. C. Phillips of Dunnville) in connection with the T. H. & B. Railway in Canada

In 1928 a mixed passenger and freight service was substituted. Then, as the traffic handled on the steam trains steadily declined, it was found that the business could be handled more satisfactorily by a bus passing through a more populated district, and this has developed a certain amount of local business. The bus route mileage is 21·5 miles, giving an average monthly mileage of 3,600, and 325 hours of service. The railway company owns the bus charter, but at the present time the bus is owned and operated by a contractor to whom the railway pays a stipulated amount per trip. Railway tickets are honoured on the bus, and the operator acts as conductor, reporting all ticket and cash collections directly to the railway company. When traffic requires, additional accommodation has to be provided by the contractor. He also carries and pays for the insurance required by the Department of Highways, Ontario, and the railway company carries contingent insurance to protect its interests.

Further Participation of Indian Railways in Road Services

Encouraged by the success of the North Western Railway scheme for participation in road motor services, the Madras & Southern Mahratta Railway has undertaken a similar experiment on a somewhat larger scale. A private limited company has already been registered in South India with the object of acquiring existing road services and also operating new services, with a capital which for the present is limited to Rs. 1 lakh. It is proposed that the M. & S.M.R. should take 55 per cent. of the shares in this company. Only one-half of the capital will be called up at present, so that the immediate expenditure involved by the railway will be Rs. 27,500. The articles of association of the new company have been scrutinised in consultation with the solicitor to the Government of India and suitable amendments to provide for effective Government control have been suggested. In view of the strong recommendation on the subject in the Wedgwood Report, the Government of India favours the proposal. The Standing Finance Committee also approved it, only one member (from Madras) dissenting. The committee, moreover, expressed the view that in similar cases in future, opportunity might be given to the district boards of the areas to be served by the motorbuses, and to the public, to take up shares to the extent, say, of half the capital required, after the Government had taken up its requirements. In the present case, should further capital be required at a later stage, the committee desired that this suggestion should receive careful consideration.

Railway Road Motor Services in New Zealand

Considerable development has occurred recently in passenger and freight traffic by the New Zealand Railway Department's road services on the West Coast of the South Island. In a recent period of 32 weeks the department's cars and buses running on Westland roads carried 34,708 passengers over distances aggregating 89,288 miles. Thirteen vehicles were in service on the five regular runs and there were 71 bus trips by parties and overland tourists. In connection with the goods road services run in parts of the Westland and Inangahua Counties the 20 lorries in commission covered 152,201 miles. These figures, representing freight on 7,791 tons, with 20 weeks of the current year yet to be accounted for, are within £391 of the gross revenue of the full 52 weeks of the previous year when the goods carried totalled 10,676 tons. The total revenue from the Railway Department's passenger and goods road services operating throughout the Dominion was £194,052 for the 32 weeks' period. These figures are regarded as an encouraging indication that the provision of modern road vehicles and suitable timetables in Westland and elsewhere is appreciated by local residents as well as by the increasing number of visitors to the various tourist resorts.

Effective Road-Rail Co-ordination in New Zealand

A very useful result from recent co-ordination effected on road and rail routes in the North Canterbury and West Coast areas of New Zealand, since the purchase of passenger road services, has been a reduction in the mileage run, giving an annual saving of £6,000 in operating costs. The co-ordination has also enabled a speeding-up of services between Christchurch and the Hanmer Hot Springs resort and the various settlements *en route*, and provides better through connections between the east and west coasts, *via* the new Lewis Pass road, than were previously possible. Passenger trains have been eliminated on the Waipara-Culverden branch, and train connections improved on the Waipara-Parnassus section of the South Island main trunk line, the extension of which is now under construction from Parnassus to connect with the northern port of Picton.

Tramway Constables in Montreal

The Montreal Tramways Company is not a railway and all special constables in its employ must obtain city licences, according to a recent judgment of Recorder Semple in a test case brought by the city authorities in which the Recorder ordered Joseph Ledoux, a special constable for the company, to pay a fine of $10 and costs, or spend 15 days in jail. According to City By-law 432, concerning licenses, constables "in the exclusive service of the city, of the Government, or of railway or navigation companies" are exempt from taking out the licence. Mr. Arthur Valee, K.C., counsel for the Montreal Tramways Company, claimed that its undertaking was that of a provincial railway company within the meaning of the by-law, and that the constables of the company obtained their licences from the province.

RAILWAY NEWS SECTION

PERSONAL

Mr. Horace Shankland, of the Dunlop Rubber Co. Ltd., and a Director of the India Tyre & Rubber Co. Ltd., Inchinnan, has been elected a Vice-President of the Society of Motor Manufacturers and Traders. Mr. Shankland, who has spent the whole of his 42 years' business career in the tyre industry, is Chairman of the Commercial Vehicle Tyre Committee of the S.M.M. & T., a member of the British Manufacturers' Section, and of the Management Committee. Since 1918 (excluding the years 1928-29) Mr. Shankland has also been a member of the council of the S.M.M. & T. He is in addition an Associate Member of the Institute of Transport, a member of the council of the Birmingham Chamber of Commerce, and a member of the Management Committee of the Engineering and Hardware Section of the British Industries Fair, Birmingham.

INDIAN RAILWAY STAFF CHANGES

Mr. K. R. Rama Ayyar has, on return from leave, been appointed to officiate as Deputy Chief Accounts Officer, N.W.R., as from January 30.

Mr. K. Peddie, Deputy Chief Engineer, E.I.R., has been granted 20½ months' leave preparatory to retirement, as from February 18.

Mr. R. G. Hughff, on return from leave, has been appointed to officiate as Deputy Chief Mechanical Engineer, Jamalpur, E.I.R., as from December 31 last.

Mr. P. K. Sarkar has been appointed to officiate as Deputy Chief Accounts Officer, E.B.R., as from January 19.

Mr. R. W. Taylor has been appointed to officiate as Chief Engineer, E.B.R., as from January 23.

Mr. R. V. Ramchandani has been appointed to officiate as Deputy Controller of Railway Accounts as from February 1.

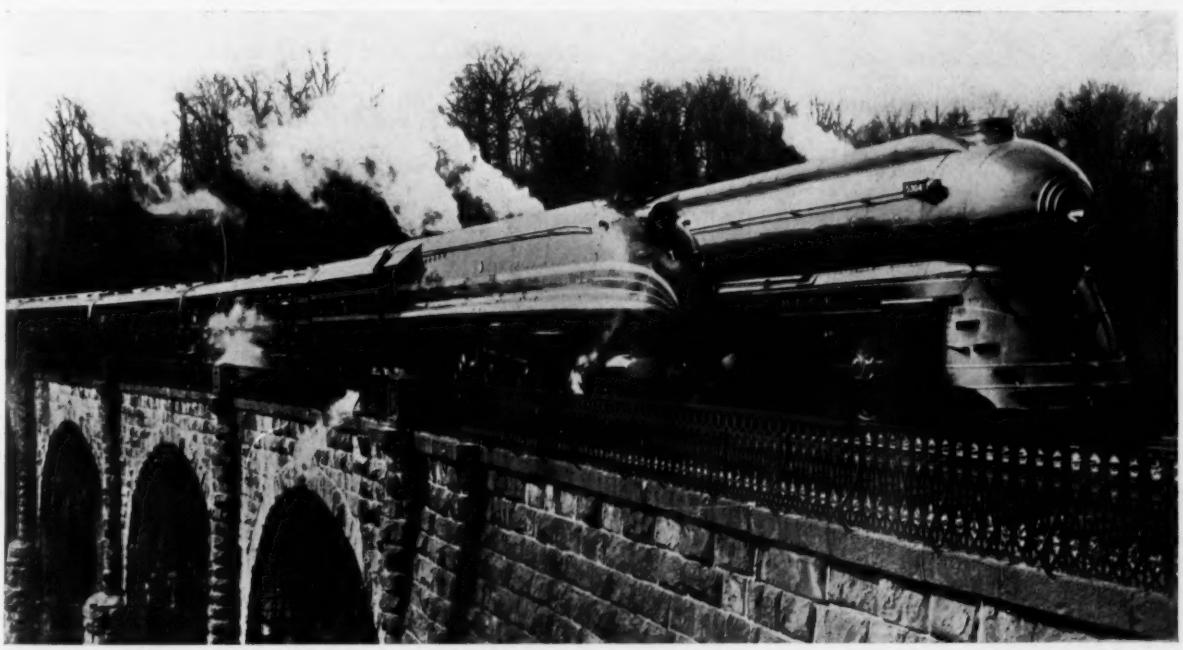
MEMORIAL SERVICE TO SIR HENRY LUNN

A memorial service to Sir Henry Lunn, founder of the travel organisation bearing his name, was held at St. Mathias's Church, Warwick Road, S.W., on March 23. Sir Henry Lunn's death was recorded in our issue of March 24. Among those who attended the service were:—

Mr. Victor P. Ceresole (representing Swiss Federal Railways, and Swiss State Travel Bureau), the Comte de Kerdrel (representing French Railways—National Tourist Office), Mr. E. Huskisson (Joint Managing Director, representing Thos. Cook & Son Ltd.), and Mr. R. H. Hacker (representing Mr. E. J. Missenden, Traffic Manager, Southern Railway).

We regret to record the death on March 23 of Mr. Albert William Hewett, founder of Hewett's Travel Agency, Dublin. Mr. Hewett was born 69 years ago in Sussex, and was employed on the former London Brighton & South Coast Railway prior to taking up an appointment in Dublin with Gaze & Sons. In 1902 Mr. Hewett opened on his own account a tourist agency in what was then Brunswick Street—now Pearse Street, Dublin. Such was the development of the business that he was eventually able to open a fine suite of offices

The late Mr. A. W. Hewett
Founder of Hewett's Travel Agency, Dublin



The L.M.S.R. Coronation Scot train, now touring the U.S.A. preparatory to being exhibited at the New York World's Fair, photographed alongside the Royal Blue express of the B. & O. on the Thomas viaduct

A typical road bridge replacing a former level crossing on the New Zealand Government Railways, where an annually increasing number of crossings in rural areas is being eliminated. (See Overseas paragraph on page 577)

One of the new streamlined trains, making use of alloy steels for weight reduction in rolling stock, introduced in June last year for the accelerated (16-hr.) *New York–Chicago Twentieth Century Limited of the New York Central System*

Right : General view of an economical type of foot overbridge recently constructed over the Bombay, Baroda & Central India Railway electrified tracks in Bombay. The structure, which is constructed on the rigid frame principle and is welded throughout, has a clear span of 33 *ft.* 8 *in., and the main structural elements consist of rolled steel joists each* 15 *in. by* 6 *in. by* 45 *lb. The foundations have been reduced to half the usual number. The structure was erected without a crane during a four-hour line possession on two successive nights. A concrete deck was added after completion of the field welding and was covered with a* $\frac{3}{8}$*-in by* $\frac{1}{2}$*-in. carpet of Plasco*

situated in D'Olier Street, Dublin. Mr. Hewett was especially successful in the organisation of tours from Ireland to Lourdes.

It was incorrectly stated in our issue of March 31 that the death of Mr. F. W. Leake, formerly Electrical Engineer of Tyer & Co. Ltd., occurred on February 26, instead of March 26. After his retirement in 1931, Mr. Leake continued to act in a consultative capacity to the firm.

Sir Thomas Brocklebank, of Liverpool, has been appointed a Director of the L.M.S.R. Sir Thomas, who is in his 40th year, is a Director of Thomas & John Brocklebank Limited, the Cunard Steam Ship Co. Ltd., Cunard White Star Limited, the Thames and Mersey Marine Insurance Company, and the Mersey Docks & Harbour Board.

Sir Kingsley Wood, Secretary of State for Air, has approved the following appointments of deputy members of the Air Transport Licensing Authority: Mr. H. O. Parker (to act as deputy to the Chairman, in his absence, and to other members); Sir James Ross; Mr. E. S. Shrapnell-Smith. As recorded in our issue of September 23, 1938, the authority consists of three members, Major-General Sir Frederick Sykes, Mr. F. R. Davenport, and Mr. Trustram Eve, K.C. (Chairman).

LONDON TRANSPORT STAFF CHANGES

Arising from a review of its organisation, the London Passenger Transport Board has made the following appointments to become effective on and from April 3:—

Mr. John Cliff will take charge of the Staff Department.

Mr. G. H. Brooks, at present General Superintendent (Road Transport), will be transferred to the Staff Department as Deputy Chief Staff Officer.

Mr. T. E. Thomas, at present General Manager (Road Transport), will become General Manager (Operation) in charge of both the railway and road transport operating departments.

In consequence of the resignation of Mr. E. Rawdon Smith, Mr. W. P. N. Edwards, at present Assistant Superintendent (Outdoor—Railways) will become Public Relations Officer jointly with Mr. F. Scothorne, at present Assistant Public Relations Officer.

Mr. J. H. F. Benford, at present attached to the Vice-Chairman's office, will become Assistant to the General Manager (Operation).

Mr. G. P. Barnett, at present Staff Superintendent (Central Buses), will be Staff Superintendent of Central Buses, Trams and Trolleybuses, Country Buses, and Coaches.

Mr. G. P. Stuart Clark, at present Divisional Superintendent (Central Buses), will become Indoor Superintendent (Central Buses).

Co-ordination of Transport in France

In the French Senate on February 28, Monsieur de Monzie, Minister for Public Works, delivered a speech on the co-ordination of transport, in which he gave an account of the progress of the scheme which, he said, dated back to 1930 when the managements of the railways for the first time considered the possibility of abandoning passenger services on railway lines with low receipts and, for reasons of economy, replacing them by bus services. Between 1930 and 1934 passenger traffic was abolished on 512 km. of line but, in fact, what had been done produced very little effect and was of slight importance.

Transport co-ordination really began with the Flandin Decree of April 19, 1934; in M. Flandin's view the closing of railway lines was to be only one of the factors in co-ordination which was, he hoped, to be the result of friendly understanding between the railways and road carriers. In spite, however, of a number of decrees, which appeared between 1934 and 1937 and were sometimes contradictory, no important positive result was reached except the closing of 178 km. of line ordered by one of his predecessors in application of the so-called Paganon Decree (1933) and it was not until the decree-law of August 31, 1937, and the administrative regulations of February 25, 1938, that a satisfactory procedure was instituted.

The foundation of the plan was the Technical County Committee, which was not, as had originally been the case, merely an emanation from the carriers but represented the contradictory interests of the rail and the road and those of the users. After an inquiry by this committee, the county council concerned drew up a county co-ordination plan, which was subsequently examined by the Superior Transport Council. Lastly, the ultimate decision was taken by the Minister. On July 26, 1938, twenty county plans had been approved, whereas at the date of his speech (namely, at the end of February 1939), 86 had been submitted by the counties and there were only three counties which were behindhand. Out of the 86 plans, 53 had been approved, of which 36 had been put into operation in their entirety and 13 partly, and 4 would be very shortly. Only 12 plans submitted by the county councils had been considered inadequate by the Superior Transport Council.

The results hitherto obtained were that on February 23, 1939, 5,320 km. of line had been completely closed to passenger traffic and 2,550 km. partly, a total of 7,870 km. With the addition of the 518 km. of line totally and 183 partly closed under the terms of the Paganon Decree, the total reached 8,581 km. Lastly, in the course of March it was hoped that 1,628 more km. would be dealt with, namely, 440 km. completely and 1,188 km. partly closed to passenger traffic. As regards the financial aspect of the question, Monsieur de Monzie said that the estimates of his predecessors, which he had been able to confirm, showed that co-ordination, taken as a whole, was equivalent to an annual saving of one milliard francs for the French National Railways Company.

A.R.P. Demonstrations by London Transport

On Thursday, March 30, impressive demonstrations of air raid precaution work were carried out by London Transport at Cricklewood Garage and Northfields railway depot. Among those present were Mr. Frank Pick, Mr. T. E. Thomas, and other prominent officials of London Transport, and the guests included representatives of the Home Office, Ministry of Transport, and the main-line railway companies, in addition to members of the press.

During hypothetical raids by hostile aircraft (which were staged with remarkable and even alarming realism), squads of men, trained in fire-fighting, anti-gas drill, and ambulance work, showed how every contingency should be guarded against and every occurrence dealt with, from the receipt of the first warning up to the "all clear." Among the principal "episodes" were the methods of rendering first aid to gassed persons and to those wounded by high-explosive bombs; the extinguishing of fires caused by incendiary bombs, when these fell in open spaces and also on or near vehicles and buildings; and the decontamination, meticulously and thoroughly, of property and clothing that had come in contact with liquid gas. As regards the latter feature, an omnibus at Cricklewood, which had been "contaminated," was saturated with water, after which the affected parts were sprayed with bleach while the handrails were treated with paraffin swabs; at Northfields, a "contaminated" underground train was passed slowly through the washing machine, brought back to the shop for treatment by solvents, and once more passed through the washing machine; in each of these demonstrations the importance of enclosing the area round the "contaminated" vehicles with chloride of lime, to prevent the escape of liquid gas in solution, was clearly indicated.

A substantial proof of realism was afforded by an unrehearsed incident at Northfields; a shed was purposely set on fire (in order to represent the effect of incendiary bombs), and so fiercely did it blaze that three fire-brigades in the vicinity turned out.

It was possible during the demonstrations to see in full detail not only the protective nature of the clothing worn by the A.R.P. squads, but also the careful and methodical way in which the men's equipment is decontaminated after exposure to gas.

XUM

Return from America*

By M. MARCEL BLOCH

The French, who have the reputation of travelling little, have nevertheless the best of reasons for being interested in that vast land, the United States of America. Their forefathers discovered part of it, and the explorations of Jacques Cartier, Chevalier de la Salle, Père Marquette, Champlain, and many others all contributed to making the New World known to Europe. It is touching, when travelling in the States, to come across districts or places bearing French names, given them by our country's explorers. These names, sounding sweet to our ears, are found all along the Mississippi Valley and around the Great Lakes.

Our language persists strongly in North America. Canada apart, fluent French is heard and shop-signs in French are seen in the Southern States, New Orleans, and its hinterland.

Not on that account, however, have I made a report on my recently completed American tour. I was sent there by our General Manager, on one hand to represent the French National Railways at the International Congress of Scientific Management, and on the other hand to study, with M. André Chapelon, the progress made of late years by the railway systems. I shall not dwell upon the congress, as I wish especially to give an account here of what I saw in the American railway world.

Passenger Carriages

In the first place all American passenger carriages are much wider than French; all carriages and wagons, without exception, run on four- or six-wheel bogies, and are much heavier than in Europe. Ten years ago an ordinary carriage or "coach car" weighed 65 tons. That it now weighs 70 tons is due to the air-conditioning applied to most carriages, as also to public buildings. In the vehicle there is a circulating system, supplying air through complicated and heavy fittings. In winter, heat from the locomotive exhaust steam is used to warm air which is forced through ducts into the coach interior; in summer a refrigerator under the coach ensures coolness in a similar way. A 35-h.p. motor actuates the apparatus and provides lighting.

Coach cars are arranged like our railcars, with a line of seats for two people on each side of a central gangway, the seats having reversible backs to allow the passenger always to face forwards. Toilet accommodation is provided at one end of the coach for men, at the other for women. A small, well-insulated tank supplies iced-water, and individual cartons can be extracted from a machine.

In the Pullman cars we find the same kind of framework, the same air-conditioning apparatus, but two kinds of interior layout. The day Pullman has a row of swivel armchairs allowing the passenger to face or turn his back to the scenery. Smoking is forbidden here, but there is a smoking room, with large spittoons, at one end of the coach. There is, of course, a lavatory at each end. Such a car weighs about 75 tons.

The sleeping car, or night Pullman, has similarly-constructed fittings, lighting apparatus, and air-conditioning. American films have made French people familiar with the interior design. On each side of a central gangway are two tiers of beds, one above the other; curtains seclude the occupant of each bed. These cars weigh about 85 tons.

Stations

In the large cities the stations are fine buildings, cathedral-like in size. Travellers enter a great vestibule, under the roof of which they can buy all they require. There are booking offices for ordinary, Pullman, and luggage tickets, cloakrooms, newspaper stands, tobacco kiosks, confectionery stalls, and so on. This great vestibule is usually the waiting room as well; it has many high-backed seats grouped in the centre.

A small notice board at the ticket offices catches the eye; on it is written the name of the ticket clerk, who is generally in his shirt-sleeves—his shirt is always spotlessly white—and often wears a celluloid shade to protect his eyes from the electric light. You say to him, "Mr. Smith, a ticket for Baltimore, please!" Always say "please" first, and "thank you" after. A characteristic of Americans is their cordial, unobsequious politeness. To your "thank you" Mr. Smith replies, "You are welcome." At the Pullman ticket office you ask Mr. Jones for your Baltimore ticket. He telephones the Central Pullman Office and asks them the number of the car and seat to be reserved for you.

At the post offices and hotel reception counters where employees are brought into touch with the general public, there is the same evident stress on the "personal touch." The idea of service, universal in the States, makes for sympathetic relationship between the public and the employee. I must emphasise that this spirit of service carries absolutely no sense of inferiority on either side.

When you have got your ticket, you entrust your bags to a "red cap," otherwise a porter, usually a negro. Ensconced in a coach or Pullman, you will soon gather that the ticket collector is a kind of *paterfamilias* in his train, who looks after everyone. The weight of the carriages, mentioned above, is such that American trains are very heavy. There is seldom a train of less than 700 tons on the main lines; more often they weigh 900, 1,000, or 1,200 tons.

Goods trains are composed of all-bogie wagons, with appreciably greater capacities than in Europe. An average for covered wagons is 43 tons; 47 tons for flat trucks, and 55 tons for hopper wagons with automatic discharge.

Locomotives

M. Chapelon and I were able to travel on many locomotives, of which I shall here refer to the newest. On level lines goods trains are generally hauled by Mountain type engines, which can pull 4,000-ton trains at maximum speeds of 70 m.p.h. Where coal and mineral traffic is handled, much heavier trains are found. On the Chesapeake & Ohio, for example, 10-coupled engines with a pair of trailing wheels and a leading bogie, haul 12,500-ton trains. Similarly on the Norfolk & Western, Mallets haul 11,000-ton trains. The latter especially interesting engines were built in the company's own shops at Roanoke. Some of them are 2-6-6-4 with four simple-expansion cylinders. The most up-to-date are 2-8-8-2 4-cylinder compounds. We travelled on a locomotive of this type, some dimensions of which are given below:—

Cylinders—	
H.P. dia.	25 in.
L.P. dia.	39 in.
Stroke	32 in.
Piston valves—	
H.P. dia.	14 in.
L.P. dia.	18 in.
Coupled wheels, dia.... ...	4 ft. 10 in.
Firegrate area	11·7 sq. ft.
Boiler pressure, per sq. in. ...	145
Tractive effort—	
As compared	129,281 lb.
As simple	155,250 lb.
Weight of engine, in working order	260 tons.
Water capacity of tender ...	21,000 gall.
Coal capacity of tender ...	26 tons.
Weight of tender, full ...	168 tons.
Total weight of engine and tender	428 tons.
Length, overall	115 ft.

This locomotive is actually one of the heaviest machines in the world. The trip we had on her footplate took us across the Alleghanies, up gradients exceeding 1 in 50, and round curves and reverse curves of sharp radius. Our train of 63 wagons weighed about 2,800 tons. The duties of driver and fireman are particularly light on these American engines. Both are seated, one on each side of the cab. The driver concerns himself, of course, with signals, regulator, and reversing (a task made effortless by a servo-motor), and glances now and then at his gauges. The fireman operates the stop-cocks working the mechanical stoker or adjusting the feed-pump. The size of the boiler enables the engine to make long runs and perform continuous collar work without the

* Abstract of an article in *Notre Métier*, the staff journal of the French National Railways, by the Chief of the Locomotive Maintenance Department, S.N.C.F.

pressure and water level falling low. So many were the bends and reverse curves that often we could not see the tail of the train. At some stations which the train passed without stopping, the fireman leaned out of the cab to catch a rush-hoop, to which a message was attached, and which the stationmaster handed him. These messages were from the train despatchers and gave advice of the state of the road, and so on. The engineman replied by scribbling messages which were handed out at the next station.

Always on the part of driver and fireman we found the ubiquitous American friendliness. They took upon themselves to acquaint M. Chapelon and myself with all the details of their work.

We travelled on passenger trains as well. About four in the morning we got a train running on the western route between Chicago and Omaha, with the same engine throughout. The condition of the engine and in particular the boiler is as good at the end of a long run of 500 miles as at the end of a short run. This engine, a streamlined Hudson of the Chicago & North-Western, hauled a 900-ton train under easy conditions; it was not very fast, but sometimes touched 80 m.p.h. We also went on the Hiawatha, a very well-known train running between Chicago and St. Paul, and touching 100 m.p.h. on many sections. Two types of locomotive are used: (1) streamlined, oil-fired Atlantics—three years old—for trains of about 400 tons; (2) newer streamlined Hudsons for hauling trains of over 1,000 tons, and coal-fired.

Returning from Denver to Chicago, after a trip on a locomotive over the Rockies near Cheyenne, we travelled in the streamlined diesel train City of Denver, hauled by two 12,000 h.p. diesel locomotives. The 1,000 miles between Denver and Chicago took 16 hr. We could judge that the speed was often 90-100 m.p.h. The driver of this train is in a compartment behind the front motor and high enough to give an uninterrupted view.

Maintenance

The workshops of the different systems we visited are well-equipped and contain very robust machine-tools, well adapted for the work required of them. All the workers have the costs of repairs at their finger-tips. If you ask a workshop employee, whether engineer, foreman or workman, "Why do you do a job like this, instead of like that?" the answer comes, "Because it means a saving of so many dollars." The excellent standard of repair work, tending towards an even closer margin of machining, makes for a lower and lower cost price.

Courtesy

The friendliness and courtesy to which I have already referred is found among all grades. M. Chapelon and I were very pleased to observe the confident cordiality in the relations between chiefs and subordinates. One discerns, underlying these relations, the basic idea of equality between men, which is in the soul of every American.

Institution of Locomotive Engineers Annual Dinner

Again a record in attendance, the annual dinner of the Institution of Locomotive Engineers was held at the Trocadero Restaurant, London, W.1, on March 31, under the chairmanship of Sir H. Nigel Gresley, C.B.E., who deputised in the absence through indisposition of the President, Mr. W. A. Stanier. Those present included :—

The Rt. Hon. Leslie Burgin, M.P., Lord Stamp, Sir Cecil Bottomley, Sir Ronald W. Matthews, Sir William V. Wood, Mr. Robert Holland-Martin, Lt.-Colonel A. H. L. Mount, Mr. O. V. S. Bulleid, Lt.-Colonel F. R. Collins, Lt.- Colonel D. J. McMullen, Colonel C. G. Du Cane, MM. R. Leguille and A. Mertz, Rai Bahadur P. L. Dhawan, Messrs. R. E. L. Maunsell, A. F. Bound, E. Bruce Ball, W. S. Graff-Baker, W. A. Agnew, C. N. Goodall, A. Hervé Browning, J. Boot, and A. C. Carr.

Sir H. Nigel Gresley, after the loyal toast had been honoured, announced the sending of a telegram wishing, on behalf of all present, a speedy recovery to Mr. W. A. Stanier from his indisposition.

Mr. O. V. S. Bulleid, proposing the toast of "The Guests," welcomed Dr. Burgin, Lord Stamp, Mr. Holland-Martin, Colonel Mount, and the members of his Indian committee, the presidents of the Institution of Mechanical Engineers and Institution of Railway Signal Engineers, Brig.-General Mance, and a representative from the Belgian Railways. They looked forward, he said, to the forthcoming report of the Indian Pacific Locomotive Committee, and wondered how Colonel Mount would determine the causes of derailments long after they had occurred. They felt it a tribute to the safety of the railways that Colonel Mount's attention was now to be given to helping with the problem of the large number of road accidents.

Mr. R. Holland-Martin, responding on behalf of Lord Stamp, expressed their good fortune at having the Minister of Transport as their principal guest, and referred to the Minister's recent footplate experience on the L.M.S.R. None of the railway chairmen stood before them in penitential sheet. They were proud of the railways they controlled and of the officers who ran them.

Lord Stamp, who had returned from another engagement, added his response to the toast, and referred to Dr. Burgin's recent driving experience. It was his pleasant duty as Chairman of the L.M.S.R. to hand to Dr. Burgin the official log of the trips and a driver's cap. This he did amid applause and laughter, and Dr. Burgin donned the cap and continued to wear it during most of his own speech.

The Rt. Hon. Leslie Burgin, proposing the toast of "The Institution of Locomotive Engineers," said he would ever cherish the engine pass he had received for his trip as it prescribed that the company would in no circumstances whatever be held liable for loss of life or personal injury however caused. He would also preserve the little book of words telling him where there were water troughs, as though one did not know when one was in the cab. What an interesting experience it was not only to note the camaraderie between driver and fireman but to hear their "very real tributes" to the Chief Engineer of the line. How easy it would be for the Cabinet of Great Britain in international affairs if only the moment of tension in steering was whenever there was a signal at danger. Dr. Burgin expressed the indebtedness of railway engineers to their German friends and particularly to Dr. Dorpmüller, who had sent them valuable details regarding flange forces.

Sir H. Nigel Gresley, responding on behalf of the President, paid a tribute to Mr. W. A. Stanier, particularly for his admirable presidential address which he commended to all interested in the problem of the steam locomotive. He referred also to the new testing station now being built at Rugby. Sir Nigel Gresley said that the institution was very successful, though there had been a slight decline in membership; an Australian section had been formed with forty members. Sir Nigel Gresley presented the awards for papers read in the session 1937-8 and expressed the gratitude of the institution to Mr. Julian Tritton and his sister for their gift of £500 for an award in memory of their father, Sir Seymour B. Tritton.

FOREIGN VISITORS.—The advance in the number of visitors to Great Britain during the first month of the year was succeeded by a further increase in February. The Travel & Industrial Development Association states that the official Home Office February return of 18,989 tourist and business visitors represents an advance of 2,010 upon the total for the corresponding month of last year.

PROPERTIES AND TESTING OF HEAT INSULATING MATERIALS.—The Joint Committee on Materials and their Testing of Technical Institutions and Societies in Great Britain is organising a discussion on this subject, which will be held on November 23 next in London, in conjunction with the autumn meeting of the Institution of Gas Engineers. The discussion will be divided into three sections, namely: (1) high-temperature insulating material; (2) low-temperature insulating material; and (3) insulation of buildings and other applications. It is intended that the papers shall review the present position of research and current opinion here and abroad.

XUM

Official Notices

Bengal-Nagpur Railway Company Limited

THE Directors are prepared to receive Tenders for :—

440 STEEL ENGINE TYRES.

Specification and Form of Tender can be obtained at the Company's Offices, 132, Gresham House, Old Broad Street, London, E.C.2, on or after 31st March, 1939.

A fee of 10s. will be charged for each copy of the Specification, which is *NOT* returnable.

Tenders must be submitted not later than Noon on Friday, 14th April, 1939.

The Directors do not bind themselves to accept the lowest or any Tender, and reserve to themselves the right of reducing or dividing the order.

By Order of the Board,
T. R. WYNNE,
Managing Director.

HAULAGE rates required for portable buildings, approximately 6 tons per load to various parts of England, Scotland and Wales. For further particulars apply MESSRS. CROSSY & Co. LTD., South Street, Farnham, Surrey.

Notes and News

The Channel Tunnel.—The Paris Chamber of Commerce passed a resolution on March 27 in favour of the rapid realisation of the Channel tunnel.

Colombia Railways & Navigation Co. Ltd.—The registered office of this company is now at 9-10, Saville Row, London, W.1.

New Bilbao Station.—The new terminal station of the Portugalette Railway at Bilbao was opened to service on March 20. The new station adjoins the Victoria bridge, and while technical requirements and the convenience of travellers have been fully considered, the architectural design of the exterior is in accord with the general line approved by the city authorities in connection with the town planning scheme.

Noise Stops Sunday Work at Ilford.—The L.N.E.R. announces that, on account of the disturbance caused to local residents by noise, Sunday work on the electrification scheme near Newbury Park station will not be continued, and the full Sunday train service between Newbury Park and Ilford was therefore resumed on April 2. Until May 26 the engineering work will proceed daily (except Saturdays and Sundays) between 9.45 a.m. and 4.30 p.m. and the passenger train service between Ilford and Newbury Park during these hours is being replaced by buses. The usual service will operate during the morning and evening, and throughout the day during the Easter Holiday period (April 6 to 11).

Cars by Rail While Road is Repaired.—The L.N.E.R. has arranged special cheap rates for the conveyance of motorcars between Fort William and Mallaig while the road is being reconstructed. This road, which connects Fort William (the old capital of the Highlands) with Mallaig (the port for the Hebrides on the west coast), has a notoriously rough surface and is now being reconstructed and brought up to modern standards. While this work is in progress the L.N.E.R. has arranged for reduced rates of 10s. single and 15s. return for the conveyance of privately-owned motorcars between the two towns or intermediately. The only condition is that the car should be accompanied by passengers holding one first class or two third class tickets. The distance between Fort William and Mallaig by rail is 42 miles.

The Mont Blanc Cableway.—Work has been begun on what is to be the world's highest cableway, that on the southern peak of Mont Blanc. The upper terminus of the line will be at an altitude of 11,963 ft. Two cabins will be used, one in each direction. Each cabin will have space for 15 passengers and a conductor. When the railway is completed it will be possible to go ski-ing all the year round; at present this is only possible for expert skiers. The cost of building the line is estimated at £28,000.

Argentine Railway Earnings.—The gross receipts of the privately-owned Argentine railways for the first five months of the financial year 1938–39 (July–November) amounted to 148,667,000 pesos m/n., a decrease of 15,525,000 pesos, or 0·5 per cent., compared with the corresponding period of the previous financial year. The receipts of the British-owned railways, included in the above figures, were 133,146,000 pesos, or 12,825,000 pesos (8·8 per cent.) less. The decrease in the aggregate figures was principally in goods traffic, which showed a fall of 13,523,000 pesos, or 11·9 per cent. Passenger receipts were 1·7 per cent. higher, although the number of passenger journeys had increased by 4·7 per cent.

Contracts and Tenders

D. Wickham & Co. Ltd. has received an order from the Midland Uruguay Railway for one petrol-driven gang trolley.

Guest, Keen & Nettlefolds Limited has received an order from the Argentine North Eastern Railway for 21,000 steel fishbolts and nuts.

Leyland Motors Limited has received an order from the Halifax Joint Omnibus Committee for two diesel-engined single-deck passenger vehicles.

Burn & Co. Ltd. has received an order from the Indian Stores Department for one I.R.S. metre-gauge bogie petrol tank wagon, type MBTP.

Parry's Engineering Limited has received an order from the Chief Controller of Stores, Indian Stores Department, New Delhi, for the supply of 5,800 helical springs at a total price of Rs. 29,725.

Hermant Hicquet Usines & Fonderies has received an order from the Egyptian State Railway Administration for bolts and nuts (Order No. 3,353, items 3-7, total cost £224 2s., delivery free Gabbary).

Railway and Other Reports

Grand Union Canal Company.—Gross receipts for the year 1938 amounted to £221,814, against £228,041 for 1937, and working expenses to £153,529, compared with £158,016. Tonnage receipts were £125,748, a reduction of £7,911 which is largely accounted for by the decrease in the consumption of coal by power stations situated on the Regent's Section due to centralisation by the Central Electricity Board, and by a fall in timber imports. The amount at credit of net revenue account is £89,666, to which must be added £7,586 brought forward. After deducting allowances to ex-employees, interest on superannuation fund, and sinking fund appropriations together amounting to £7,683, debenture interest £69,774, a further £3,100 to renewals reserve, £4,178 to reserve for depreciation of interests in subsidiary companies, and £3,739 to general reserve account, there remains a sum of £8,778 to be carried forward.

West Yorkshire Road Car Co. Ltd.—This company is controlled jointly by the L.N.E.R. and L.M.S.R. Companies and Tilling & British Automobile Traction Limited. In the year 1938 traffic receipts and other income, less operating, management, and general expenses, amounted to £376,060. After deducting charges for fuel taxation and vehicle licences, directors' fees, and appropriations to income tax and depreciation reserves, the net profit for 1938 was £91,795, compared with £80,607 for 1937. Adding £12,875 brought forward gives a total of £104,670, against £93,375. The dividend on the 6½ per cent. preference shares again takes £13,000, and the 10 per cent. dividend (5 per cent. interim and 5 per cent. final) on the ordinary shares, although at the same rate as that for 1937, requires £78,750, against £67,500, leaving £12,920 to be carried forward. The issued capital was increased during the year to £987,500 by the allotment of 112,500 ordinary shares of £1 each. The bus station at Harrogate has been completed, and the garage at Bradford is being extended.

Forthcoming Events

Apr. 11–15.—Model Railway Exhibition, at Central Hall, Tothill Street, London, S.W.1.

April 12 (*Wed.*).—Diesel Engine Users' Association, at Caxton Hall, Caxton Street, London, S.W.1, 4.45 p.m. Discussion: "Bulletin, 1938."

Institute of Transport (Scottish), at St. Enoch Hotel, Glasgow, 7.15 p.m. "The Legal Obligations of Transport Operators," by Messrs. J. Cairns, D. Lamb, J. Swann, and H. Hasson.

Apr. 14 (*Fri.*).—Institute of Transport (Newcastle), at Royal Station Hotel, 7.30 p.m. Annual General Meeting.

In view of the Easter holidays, this issue of THE RAILWAY GAZETTE *is published three days earlier than usual, and consequently the tables of British and foreign railway traffic returns are held over until next week*